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THE SERIAL TONE-ROW
AN APPROACH TO MUSICAL UNITY

by

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ABSTRACT

This study examines the extent to which the serial tone row contributes to unity in a musical composition.

Chapter I begins with a brief discussion of the nineteenth-century period of romanticism. Experiments from this period which led to the breakdown and eventual disintegration of the tonal system are also mentioned. The early attempts at serial organization are then discussed, concluding with a summary of the compositional method proposed by Joseph Hauer.

In Chapter II, Arnold Schoenberg's system of composition known as the "twelve-tone" method, is examined. This system, contemporary with Hauer's method, forms the basis for serial composition. An explanation of the compositional procedure is followed by an investigation of Schoenberg's application of the row techniques as a unifying element.

Chapter III deals with two of Schoenberg's pupils, Alban Berg and Anton Webern. Both these men adopted the principles of composition advocated by Schoenberg, evolving their own personal idiom. These personal styles of composition are noted and the treatment of the row by each composer is examined to determine its contribution to the compositions.

Chapter IV discusses some of the developments of the

serial technique which occurred after Webern. These include total serialization, exploration of electronic media, and the application of tone-row techniques in the serial works of Igor Stravinsky.

It is concluded that a serial tone row acts as a strong unifying force when used as the central technique of a composition.

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INTRODUCTION

Unity is largely dependent upon the interacting relationships of the musical elements contained within a composition. Moreover, the manner in which these different factors are related helps to determine the compositional style of the work. To achieve unity in their works, composers of every period have developed a variety of compositional devices and forms and each of these can be related to one of two basic concepts. The first is the principle of repetition, which is acknowledged to be a decisive factor in giving shape to music. Many of the commonly used musical devices are related to this principle; ostinato patterns, passacaglia, canon and free variation all derive from some sort of repetition. The second concept common to music of all ages is the principle of symmetry; phrase structure, formal divisions, setting of text, and instrumentation are all influenced by this principle. In musical composition balance and interest have been provided by a freely derived mixture of symmetrical and asymmetrical elements, and from these, combined in various patterns of repetition, musical forms have been developed.

Changing concepts of beauty and expression caused old forms to be adapted to fit the needs of the composer

and his period. Various musical forms reflected contemporary attitudes to unity. Especially in early music, the text had a strong influence on the formal structure. In the music of the ars antiqua the formal framework was determined by adherence to the system of rhythmic modes and by a reliance on the cantus firmus as the basis of the composition. During the fourteenth through sixteenth centuries increasingly complex polyphonic structures appeared. Unity was closely related to several compositional techniques; isorhythm, for example, was a device employed by fourteenth-century composers as a unifying element in a musical style of great irregularity and complexity. Fifteenth-century music was modified by the warmer elements of Humanism; isorhythm disappeared and unity became more dependent upon the various applications of the cantus-firmus technique. Devices such as paraphrase, head-motive, and parody appeared. Eventually the use of canon and imitation led to the full flowering of sixteenth-century style, and to the unifying method of point imitation.

The diatonic tonal system, which had its beginnings during the last few decades of the sixteenth century, dominated Western music for about the next three-hundred years. During this time a structured system of functional harmony evolved and many forms dependent upon tonality appeared. The fugue, rondo, and sonata-allegro were established. Additions were constantly being made to the new language so that by the late ninteenth century it was becoming

over-burdened with chromatic alterations. The strict forms established earlier were modified as were musical ideals, and the principles of unification were again changing.

In the twentieth century numerous approaches to the problem of unity have been explored. Some composers, like Hindemith and Stravinsky, have tried to establish a new set of functions for tonality. Others, like Shostakovich, use key centres and an expanded vocabulary of chord structures. Still others have abandoned the ordering precepts of tonality and have tried to write in an idiom which endeavours to exploit equally all the members of the chromatic scale. The method developed by Arnold Schoenberg has been used by a number of twentieth-century composers. The system, referred to as "twelve-tone composition," is based upon the arbitrary ordering of the twelve notes of the chromatic scale. Schoenberg claims that through the constant use of this row, unity will be achieved.

It is the purpose of this study to examine how the row is used in a musical composition and to what extent it contributes to the unity of the work. It is acknowledged that elements other than the row influence unity, but these are beyond the scope of this study. Compositions by various composers will be examined to observe how the row technique is adapted to each particular style. Attention will be paid to internal relationships in the row and to the interaction of the row and its transpositions.

Mention will also be made concerning the effect of the row on harmonic structure.

CHAPTER I

HISTORICAL BACKGROUND

The musical expressions of the twentieth century have often been described as having incomprehensible forms and of exhibiting disregard for past traditions, but many of the sounds, ideas and changing attitudes have deep roots in the social and musical heritage of the nineteenth century. A review of the innovative and unusual additions to the vocabulary of nineteenth-century music reveals the gradual breakdown of traditional idioms and practices.

The nineteenth-century period of romanticism has been called "this dynamic era of action and organization which tried to seize upon and unify everything."[1] An Austrian aristocrat described the period this way:

> Our century is the century of movement, just as the preceding century was that of pleasure and of contemplativeness. We are no longer allowed to live agreeably in that place which birth and conditions have chosen for us, like a comfortable oyster on its bank. A general stir, a restless ambition is the characteristic mark of our time, and in this general mobility each wants to and must find his place, since it is no longer possible to withdraw from it with impunity.[2]

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[1] Paul Henry Lang, Music in Western Civilization (New York: W.W. Norton and Co., Inc., 1941), p. 736.

[2] Victor von Andrian-Werburg, Oesterreich und dessen Zukunft (Hamburg, 1843), I, pp. 48-49, (Pub. anon.). Quoted in Eugene N. and Pauline R. Anderson, Political Institutions and Social Change in Continental Europe in the Nineteenth Century (Los Angeles: University of California Press, 1967), p. 11.

The era was a time of great social turmoil. Manifestations of the desire for social change included the political dream of unification of the territories and resources of the many German states, and the gradual replacement of the cottage industries with large capitalistic collectivizations of men and materials. As if to counterbalance this increasingly impersonal movement, radical social reformers appeared. Claude Henri, Count of Saint Simon, advocated the abolition of property inheritance as one means of equalizing the distribution of wealth within society. Socialist ideals, stemming from doctrines of Rousseau and the extreme Jacobinism of the French Revolution, gathered followers. Robert Owen, a wealthy English industrialist, advocated better conditions for the workers, and was active in the early trade-union and co-operative movements. Suffrage was slowly broadened, civil rights, and individual freedoms were extended. Curbs and restrictions on marriage, travel and domicile were largely removed. Throughout Europe these social reforms were coupled with a rising nationalistic spirit.

The world of the romantic artist was in a similar state of turmoil. The artist's place in society was radically changing, as was his personal attitude towards this society. He was no longer a household servant of the aristocracy and the result was a change in his attitude towards composition. The relationship between Beethoven and his patrons, the aristocracy, is a good example of the changing position of the artist. It is inconceivable that Haydn or Bach would

have dealt with the nobility in the familiar manner Beethoven used. The following is an excerpt from a letter sent by Beethoven to one of his patrons, the Archduke Rudolph:

> Most profoundly do I regret that I am unable to wait upon you today, not only on account of the bad weather which increases the catarrh which I am suffering, but also because I am very much rushed with composing something which must be sent off by a certain opportunity...[3]

Beethoven's work took precedence over any of his other engagements, a position he maintained throughout his life. This attitude became the natural posture for the artist of the nineteenth century. Closely coupled with this position was another idea which interested artists, poets, painters and musicians alike. This idea was a dream of a fusion of the arts and the creation of an all-embracing and universal art work. As part of this movement, E.T.A. Hoffmann painted and composed, in addition to his literary writing; and Goethe wrote poetry to fit existing music. Heinrich von Kleist went so far as to claim that music was the root and formula for all the other arts and that through counterpoint he hoped to find important relations concerning the nature of poetry.[4] Wagner continued this tendency in the creation of his music dramas.

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[3] Emily Anderson, ed., Letters of Beethoven (London: Macmillan and Co., 1961), II, p. 864.

[4] Walter Silz, Heinrich von Kleist (Philadelphia: University of Pennsylvania Press, 1961), p. 286.

It is not surprising that parallel to the changes in the composer's environment and his social attitudes, a change in his musical language also appeared. The demands of the contemporary literary ideals created a need for increasingly sensational devices, resulting in a loosening of functional tonality. Towards the end of the era irregular or unusual harmonic progressions became the normal practice. Unconventional resolutions, frequent distant modulations, enharmonic changes and the extensive use of accented unessential notes produced a series of harmonies to which it became increasingly difficult to assign any key centre. These practices were extensively used by Wagner and so became associated with his musical technique and style. The extension of Wagnerian techniques contributed to a suspension of tonality, leading eventually to atonality and serialism.

The weakening of the tonal system was a gradual process. Instances of irregular resolutions, unusual chord formations and unexpected modulations can be found in many works of the classic era, especially those of Haydn, Mozart, and Beethoven, but these unusual harmonic practices were heard in the context of the existing system and did not fundamentally disturb the formal structure of the works. It was when composers began to search for a means of expressing extra-musical or programmatic ideas that the structural principles associated with tonality began to lose some of their unifying power. Hector Berlioz presented a new idea in his works, "sonority; sonority for its own sake:

sonority which engenders ideas."[5] Berlioz organized his sonorities in new ways. Moreover, the strict formal structures of the classical period were modified to fit the expressive needs of the idea or emotion to be expressed. A unifying theme, "l'idée fixe", appeared throughout the movements. Cross references and quotations, combined with the abolition of distinct pauses between movements, created a new approach to musical unification.

Franz Liszt continued the innovations of Berlioz. Liszt investigated the possibilities of a form which would be born out of an expression of the modern ideas of romanticism. The result was a change in attitude towards form and "the dialectical unity of classical music was replaced by a unity of mood."[6] While experimenting with aspects of form and mood, Liszt also explored new sonorities. An interesting example of his later experiments is a short piano piece, dated 1885, called Bagatelle ohne Tonart. The work, only recently discovered, was to have become the fourth Mephisto Waltz.[7] The Bagatelle is based exclusively on a diminished-chord structure. The mood of the work is set in the opening bars by a mysterious four-note figure which ends with a

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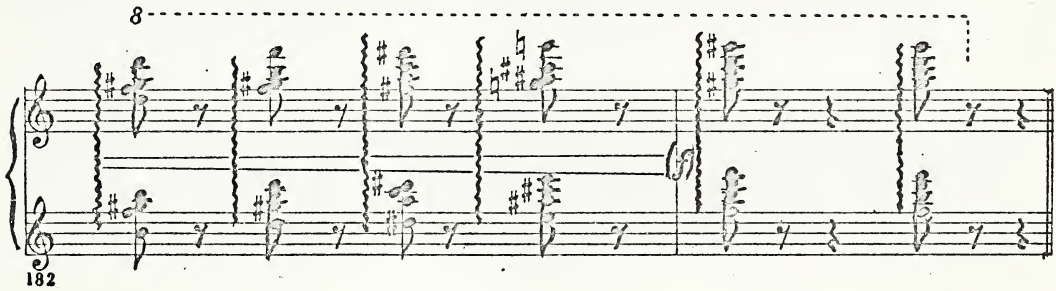
[5] Lang, Music in Western Civilization, p. 861.

[6] Ibid., p. 866.

[7] Details regarding the discovery and placement of the Bagatelle are found in the monograph by Humphrey Searle, The Music of Liszt (New York: Dover Publications, 1966), p. 115.

diminished fifth. Throughout the entire work there are no cadences which confirm or even strongly suggest a tonal centre and, as the following example indicates, the final cadence is equally inconclusive. (Example 1.)

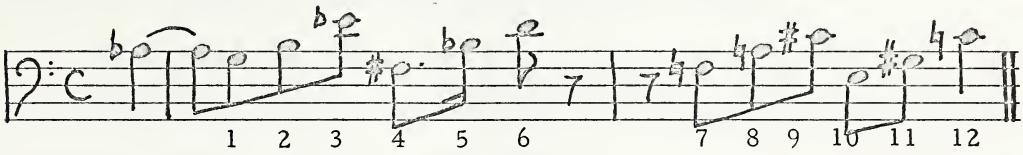
Example 1. Liszt, Bagatelle ohne Tonart, bars 182-183.



The work achieves unity through a consistent sonority, engendered by the diminished chords, and through a unity of motives. The motives stated in the opening twelve bars provide the material for the entire composition. The structure is a simple three-part form with a coda. The ideas presented in the piece -- the limitation of musical means, and the movement away from tonality -- strongly foreshadow the musical events of the twentieth century.

Other nineteenth-century composers also hinted at the atonal and serial developments of the early twentieth century. The following melodies contain early examples of the melodic use of the full resources of the chromatic scale. (Examples 2 and 3.)

Example 2. Liszt, theme from the Faust Symphony.



Example 3. Strauss, theme from Thus Spake Zarathustra.

Both the Liszt melody and the Strauss melody use all the notes of the chromatic scale before any note repetition occurs.

Melodies of this nature presented new problems to the composer. Because the use of all the notes of the chromatic scale expanded the range of expression beyond the limits of traditional tonality, a strong unifying element in the structure was needed. The search for this element occupied composers into the twentieth century.

Several early twentieth-century composers, interested in forms of expression existing outside the bounds of tonality, began to search for other arbitrary means by which they could exercise control over the materials in their compositions. Many of these composers experimented with a type of serialism. The experiments took varying forms; some used

new scales, others worked with specific chord structures and still others tried arbitrary melodic plans.

Ferruccio Busoni was one of the early advocates of new scale structures. Writing in his Sketch of a New Esthetic of Music, Busoni claimed, "we possess one single scale",[8] referring to the major diatonic scale. He considered the minor scale to be a variant of the major scale, and modulations were only transpositions of the original scale. Busoni established 113 different seven-note scales. The scales and their transpositions were to be used singly or in combination to produce a new expanded musical vocabulary.

The impressionistic composers were also interested in new scales. The oriental and pentatonic scales held a fascination for them, as did the old modal scales. New harmonic practices were used, some related to the modal idioms, and others resulting from an expanded harmonic vocabulary. Many works were freely derived from old forms while the musical unity was achieved by motivic relationships, or by a unity of sound structures. An extension of the idea of uniformity of sonority is explored in Debussy's piano prelude, Voile. The result is a modest attempt at the serial use of a scale. The prelude is based exclusively on two restricted groups of tones arbitrarily chosen from the chromatic scale. The first group is used for the opening and closing sections of the work. (Example 4.)

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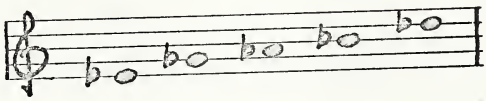
[8] (New York: Dover Publications, 1962), p. 91.

Example 4.

The order of the notes is not dictated. Contrast is achieved through the use of a second group of unordered notes for the centre section. (Example 5.)

Example 5.



The significant aspect of this composition is that both melodic and harmonic materials are drawn from the restricted note groupings. In this way the work shows similarities with the Liszt Bagatelle, but the Debussy prelude is even more restricted. Although this is a very simple approach to a serial structure, it does represent one of the directions in which composers were experimenting.

Another composer who was interested in tonal experiments was the Russian, Alexander Scriabin (1872-1915). Scriabin often departed from the traditional norms in both

his compositions and in his life style.[9] As early in his compositions as the prelude Op. 37 no. 2, written during the productive summer of 1903,[10] Scriabin began to use chords built in fourths. By 1910, in the composition Prometheus he had begun using the "mystic chord" as a basis for compositions. Scriabin derived the chord from the harmonic series, and spelled it as a series of fourths: C, F sharp, B flat, E, A, D, G. As well as in Prometheus, Scriabin used the chord in his Seventh Piano Sonata, op. 64. This sonata, written in 1911, uses several forms of the basic chord. The chord may be written as a linear set, C, D flat, E, F sharp, G, A, B flat, or the set may be spelled in vertical fourths as the "mystic chord", or in thirds. In using this set, the second and fourth notes are occasionally altered. These elements provide the raw material for the sonata. Scriabin also used transpositions of these elements.[11] The end result is a composition based both melodically and harmonically on a closed system of notes arbit-

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[9] Scriabin, a mystic and piano virtuoso, believed that art could transform the pain and ugliness in the world into beauty. As he grew older this idea obsessed him, and he became increasingly eccentric.

[10] During that summer Scriabin composed about forty pieces, op. 30, to op. 42.

[11] An example of Scriabin's use of original and transposed forms of the basic material may be seen in bars 157-159 of the Seventh Sonata. Here, the first, fourth, seventh and tenth transpositions are used.

rarily drawn from the chromatic scale. The Seventh Sonata does not present an isolated example of the use of this technique in Scriabin's creations. Most of the pieces dating after 1910 are based upon some type of pre-determined chord structure.[12] It is because of Scriabin's use of a system of closed transpositions and a pre-determined set, or chord, that Perle believes Scriabin "may be considered the first to exploit serial procedures systematically as a means of compensating for the loss of traditional tonal functions."[13]

Another Russian, almost contemporary with Scriabin, Nicholas Rosslavetz (b. 1881), was also working with basic set formations. In the third of his Trois Compositions, 1914, Rosslavetz used a different set for each movement. The set provides the harmonic and melodic materials, but Rosslavetz used transpositions more freely than Scriabin.[14]

Two other early twentieth-century composers used a form of serialism in their writings. The first, a Norwegian pupil of Max Reger, used a system of serial melodies: Fartien Valen (1887-1952) based a number of his works on several different serial fragments which recurred in both

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[12] For a more detailed but somewhat biased discussion of these later works see A.E. Hull, Scriabin (London: Kegan Paul, Trench, Trubner and Co., 1927), pp. 101-215.

[13] George Perle, Serial Composition and Atonality (2nd ed., Berkeley, Cal.: University of California Press, 1968), p. 41.

[14] Ibid., p. 44.

complete and incomplete forms. He did not usually derive his harmony from the series for his technique was primarily linear, chords being secondary in his style. He used some mirror forms and inversions, but transpositions were rare.[15]

In America, Carl Ruggles (b. 1876) was also using a serial melodic procedure. Charles Seeger writes that the main feature of Ruggles' melodic line is the non-repetition of a tone, or any octave of it, until the tenth progression.[16] Ruggles adopted this method because he felt that the premature repetition of tones weakened the melodic line. This concept was rigidly applied to the leading melody and in a lesser degree to the remaining parts. Ruggles thought the successful application of the principle of non-repetition was entirely dependent upon the sensitivity of the composer. The work in which Ruggles' style becomes clearly defined is Men and Mountains, dating from 1924, and written for chamber orchestra.[17] Here the harmonic texture, with a preponderance of minor seconds, major sevenths and minor ninths, clearly defines the resonance which Ruggles maintained in his later works. The harmonic style is similar to Schoenberg

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[15] Humphrey Searle, Twentieth Century Counterpoint (London: Northgate and Williams Ltd., 1954), pp. 129-130.

[16] "Carl Ruggles," Musical Quarterly, 18 (October, 1932), pp. 585-586.

[17] Wilfred Mellers, Music in a New Found Land (New York: Alfred A Knopf, 1965), p. 67.

but the final result is an open polyphonic sound. Mellers compares Ruggles' chromaticism to that of Delius because, historically speaking, they are not too far apart, but "Delius is a belated and weary humanist; Ruggles is a mystic in a non-religious society."[18] Although Ruggles' style was a unique and personal statement of his New England heritage, its influence was limited. He was highly self-critical and as late as 1935 few of his works were widely accessible. He was probably unfamiliar with any of the contemporary developments by Schoenberg, which is interesting considering the similarities in their musical styles.

Two remaining exponents of the use of a serial system in musical composition are Joseph Hauer and Arnold Schoenberg.[19] Both systems appeared during the early 1920's.

Joseph Hauer (1883-1959) was largely a self-taught Austrian musician. In Groves' Dictionary he is described as the "originator of a system of atonal music."[20] Hauer's books[21] outline the elements of his system, which he said was originally conceived by analogy with Goethe's Farbenlehre.

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[18] Ibid.

[19] A discussion of Schoenberg's method and some of his compositions is presented in the next chapter of this study.

[20] Hans T. Redlich, "Joseph Mattias Hauer," Groves' Dictionary of Music and Musicians, ed. by Eric Blom (5th ed., London: Macmillan, 1954), IV, p. 135.

[21] Vom Melos zur Pauke (Vienna: Universal Ed., 1925) and Zwölftontechnik (Vienna: Universal Ed., 1926).

Redlich writes that Hauer "believed the interval with its overtones contains within itself both rhythm and melos awaiting development by the composer."[22] In his system, Hauer divided the twelve notes of the chromatic scale into two groups of six notes called "tropes". The two tropes were mutually exclusive in their content and each was characterized by the inner relationship of its intervals. The order of the notes in the trope was not pre-determined, but all the notes of one trope were to be used before continuing with another trope. Hauer distinguished four styles in the use of his tropes. Eschman lists them as: simple twelve-note melody and homophonic accompaniment, notes sustained suggesting the first step toward counterpoint, polyphonic style, and static tropes divided in vertical planes.[23] The tropes are used in a composition in their various guises as a means of providing unity to a composition. If two tropes are used as opposing forces they can provide a formal framework. If a strict note order is maintained they can become a strong constructive element. The use of rhythmic structures often played an important role in providing distinctions between the two halves of the tropes. Hauer used these methods extensively in his own compositions, but the system of tropes was not widely adopted, and no associated school grew from

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[22] Redlich, "Joseph Mattias Hauer," p. 135.

[23] Karl Eschman, Changing Forms in Modern Music (Boston: Mass.: E.C. Schirmer Music Co., 1951), p. 87.

it.[24] As a result, the influence of the system was minor, especially when compared with the influence of the contemporary Schoenberg method.

A review of nineteenth-century trends reveals the gradual but unrelenting dissolution of the traditional concepts of unity based on tonality. Although Hauer's system was far removed from the techniques of Berlioz and Liszt, the changes advocated and developed by these and other innovators of the nineteenth century began a series of explorations and experiments which ultimately led to the various atonal expressions of the twentieth century.

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[24] An extensive discussion of Hauer's techniques and compositions, and a listing of related literature is found in Monika Lichtenfeld's study, Untersuchungen zur Theorie du Zwölftontechnik bei Joseph Mattias Hauer (Regensburg: Gustav Vosse Verlag, 1964).

CHAPTER II

ARNOLD SCHOENBERG AND HIS TWELVE-TONE METHOD OF COMPOSITION

The serial composing method which was developed by Arnold Schoenberg appeared about the same time as Hauer's theory of composing with tropes. Schoenberg called his new system a "method of composing with twelve tones which are related only with one another." He claimed that "the main advantage of this method of composing with twelve tones is its unifying effect."[1] The system was not a sudden discovery. In a letter to Nicholas Slonimsky, dated June 3, 1937, Schoenberg recalls how about December, 1914, he

> sketched a symphony.... The Scherzo of this symphony was based on a theme consisting of twelve notes. After that I was always occupied with the aim to base the structure of my music consciously on unifying ideas but regulated also their accompaniment and the chords, the 'harmonies'.

Schoenberg continues, commenting that it was not until his piano pieces, Op. 23, that "I became suddenly conscious of the real meaning of my aim: unity and regularity."[2] Schoenberg's solution for achieving this aim was based upon the consistent and constant use of a basic set or series called

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[1] Arnold Schoenberg, Style and Idea (London: Williams and Norgate, 1951), p. 143.

[2] Quoted in Nicholas Slonimsky, Music Since 1900 (New York: W.W. Norton and Co., 1938), pp. 574-575.

a tone row.[3] This series consisted of the entire twelve notes of the chromatic scale. The notes in the row were representative of one of the twelve different pitches, each corresponding to a note of the chromatic scale. Thus a note could be used in any octave without changing the structure of the row. It was the order of the succession of tones that was important. The notes were arranged in a specific linear order which was to be maintained throughout the section employing the row. The linear order of the basic set was newly derived for each composition. To maintain the highest possible degree of unity Schoenberg felt that only one set should be used for any one composition.

The original form of a series is undefined rhythmically. Sections of the series in the course of the compositions may become associated with rhythmic patterns, but this is not a part of Schoenberg's serial technique. Because of the abstract nature of the relationship of the notes in a row, the row may be transposed to any scale degree. By maintaining the intervallic relationships between the different notes of the series the character of the row is preserved. Besides its original form, the row has three transformations: the inversion of the row, the retrograde of the row and the retrograde of the inversion. These, with the original row

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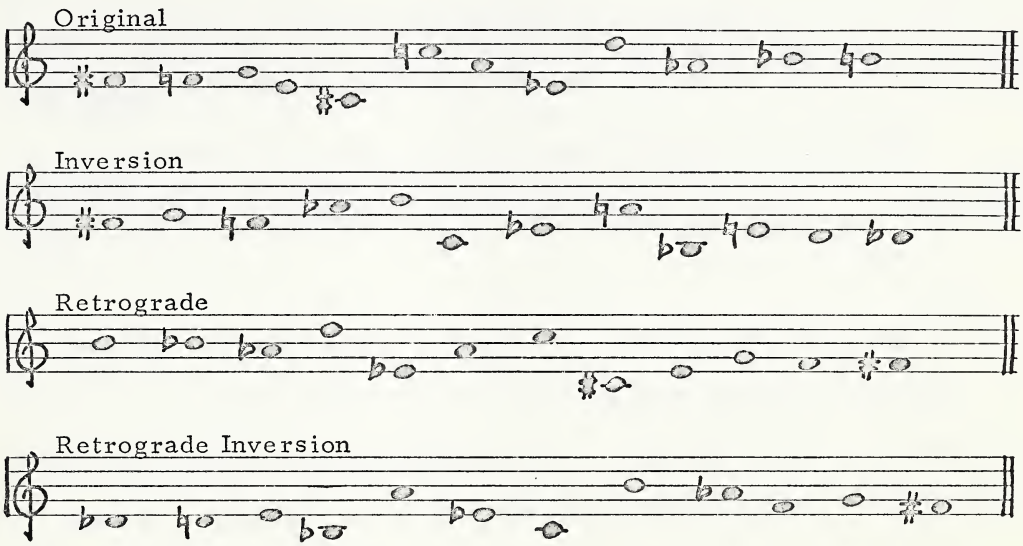
[3] The terms "row", "set" and "series" are used interchangeably throughout this study and refer to an arbitrarily ordered group of notes.

form, are the four basic linear forms of the set. (Example 1.)

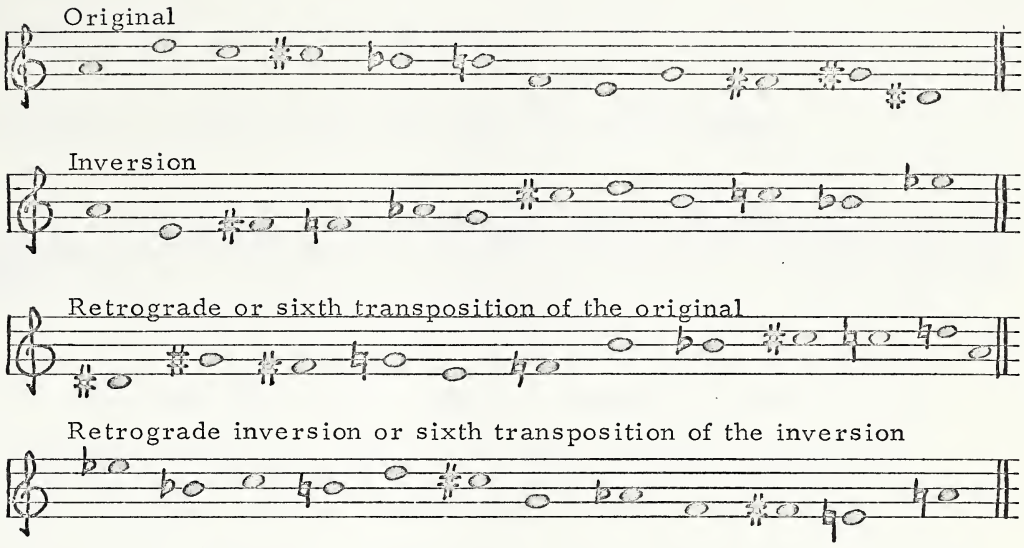
Example 1. Four basic linear forms of a row.*



*This row is also used below in examples 9-12 inclusive.

The basic forms may be transposed to begin on any scale degree making forty-eight versions of the row possible. Rows which are symmetrical have fewer transposed possibilities; two of the four basic versions of the row being the same. (Example 2.)

Example 2. Basic forms of a symmetrical row.

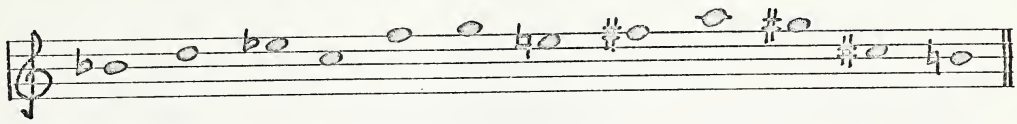

Original
Inversion
Retrograde or sixth transposition of the original
Retrograde inversion or sixth transposition of the inversion

In example 2 the second half of the row is a mirror version of the first half with the axis being the interval of the augmented fourth found between the sixth and seventh notes of the row. Because of this construction feature, the retrograde of the row is a transposed version of the original row. The same relationship exists between the inversion and its retrograde. Thus the number of basic row forms is reduced to two, and the number of possible transposed versions is twenty-four.

Although each composer develops his own musical characteristics within the twelve-tone idiom, there are a number of row formations which can be broadly classified. One formation is a row primarily melodic in construction. Composers with strong lyrical tendencies often use a row of this type because it lends itself to melodic and vocal writing. The following is a melodic row by Alban Berg.

(Example 3.)

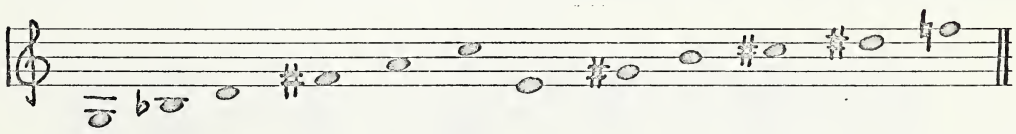
Example 3. Berg, tone row from the opera, Lulu.



This row, from the opera, Lulu, is composed primarily of consonant intervals, that is to say, singable intervals: major seconds, thirds, and perfect fourths and fifths. The perfect intervals also play an important role in outlining the contour of the row. It is pre-eminently vocal. This row, and others using similar principles, made it possible for Berg to use the human voice as one of the principal elements in the musical construction of the opera.

Another row structure often closely associated with the melodic series, is the row which has tonal areas. This type of row has the accompanying harmonic implications built into it. The rows from the Violin Concerto by Alban Berg, and the Ode to Napoleon by Arnold Schoenberg both have areas of strong tonal feeling. (Examples 4 and 5.)

Example 4. Berg, row from the Violin Concerto.

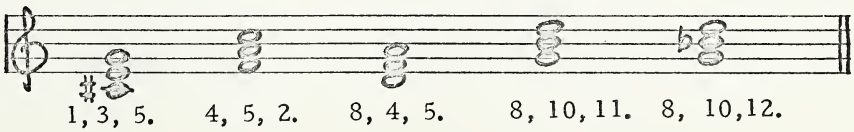


Example 5. Schoenberg, row from the Ode to Napoleon.

The row used in the Violin Concerto (ex. 4) is constructed from alternating minor and major chords and a portion of a whole-tone scale. The two tonal areas, those of G minor and A minor, are implied in the opening nine notes. The concluding three notes form a part of the whole-tone scale. Beginning on the second of Berg's row, alternating augmented -diminished-augumented chords are formed. These add colour within the row. The regular intervallic structure of the row, a continual rising in thirds, requires a careful treatment in order to prevent any monotony. Berg's solution is to use the serial technique in a free manner thereby allowing a variation in the intervallic structures.

The row used by Schoenberg (ex. 5) in his setting of Byron's poem, Ode to Napoleon, also has tonal possibilities. From this row it is possible to construct several different types of triads, some major, some minor, and others diminished. (Example 6.)

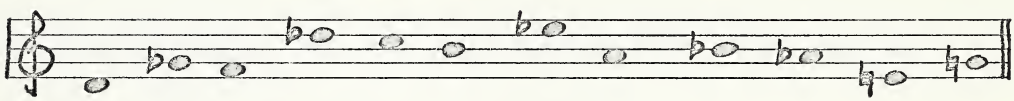
Example 6. Triads from a row of Schoenberg's Ode to Napoleon.



These chords provide a harmonic framework and can be used to emphasize certain areas as tonal centres.

Another row construction is the atonal series. This type of row carefully avoids structures which could imply a tonal area. Ernest Krenek in his Studies in Counterpoint tells the student to "avoid more than two major or minor triads formed by a group of three consecutive tones because the tonal implications emanating from a triad are incompatible with the principles of atonality."[4] To avoid tonal groupings, atonal rows generally move in chromatic steps. Semi-tones, augmented and diminished intervals are common. Krenek gives the following original example as a suitable atonal row. (Example 7.)

Example 7. Krenek, atonal row.[5]



As well as the general row types already discussed, there are two rather specific structures frequently used. The first is a symmetrical series. This series is formed when two or more portions of a row are symmetrical in their

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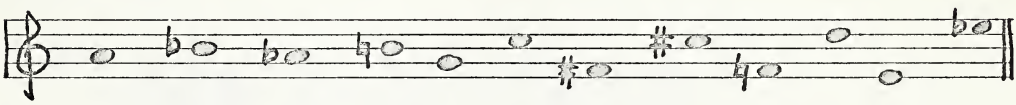
[4] (New York: G. Schirmer, 1940), p. 1.

[5] Ibid.

intervallic structure.[6] This particular type of row construction can give unity to a composition because of the close integration of materials, but it does limit the scope of the material available for development. The second structure is a row which includes all the intervals included in the chromatic scale. These intervals are the perfect fifth, minor sixth, major sixth, major seventh, minor seventh; their inversions, the perfect fourth, major third, minor third, minor second, major second; and finally the augmented fourth, diminished fifth (unchanged by inversion). There are eleven intervals in all. This type of row has one tritone within its structure and another between the first and last notes of the series. The row used by Luigi Nono in his composition, Il Canto Sospeso, is one of this type. (Example 8.)

Example 8. Nono, all-interval row from Il Canto Sospeso.



This row is also a symmetrical series; the second half of the row is derived from the complementary forms of the intervals of the first half. The augmented fourth provides the

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[6] An example of this type of row construction is found in example 2 on page 24.

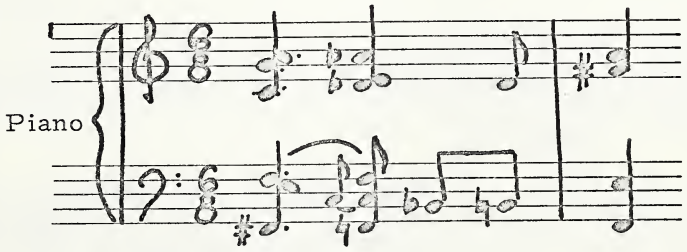
pivot which occurs between the sixth and seventh notes of the series.

In a composition the row may be used in any of its four basic forms and in any of the transpositions. Thus a wide range of materials is available. The series may be used in a strictly horizontal form as in a melody or solo line for an instrument, (example 9)

Example 9.

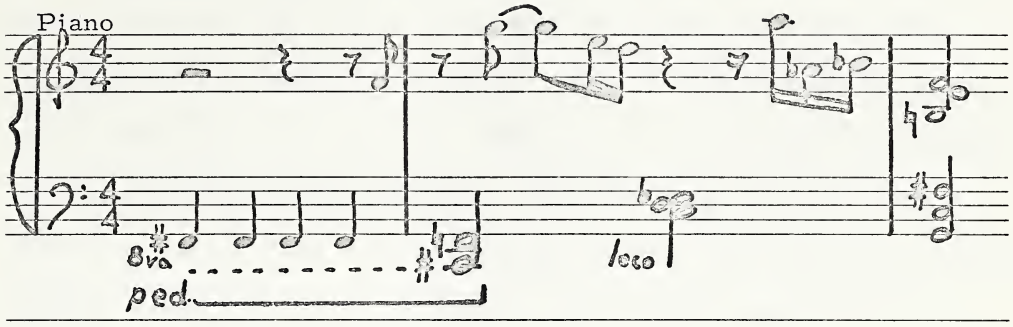
in a vertical configuration, (example 10)

Example 10.



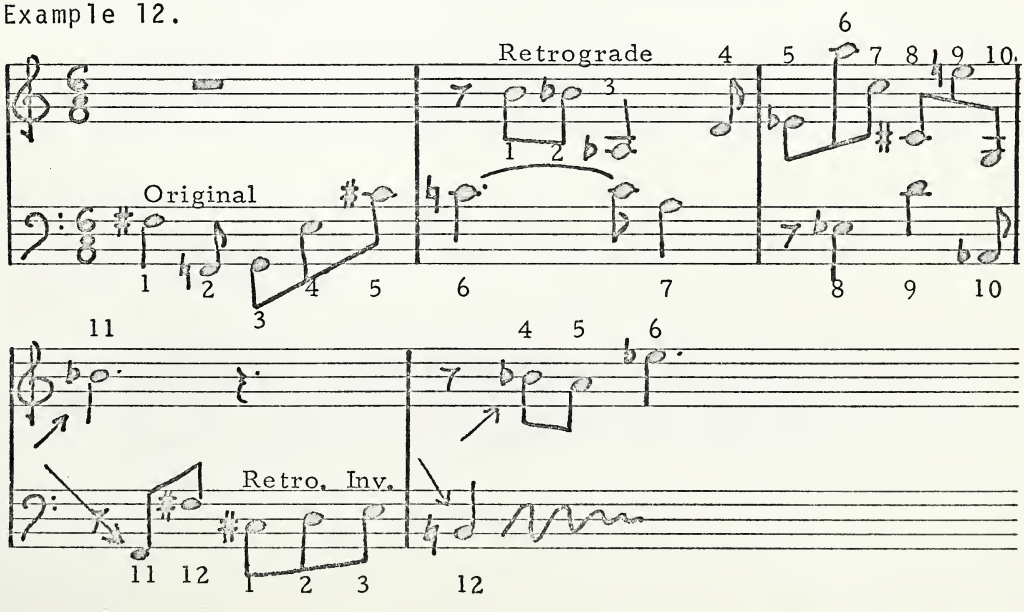
or in a combination of horizontal and vertical elements. (Example 11.)

Example 11.



As shown in the examples the notes are to be used in the pre-determined order, but variety can be achieved by movement from one row form to another. The transfer may be accomplished by a pivot on a common note or by simply beginning a new row form as soon as the old one finishes. Row forms may freely move from part to part, to add further variety. In the following example the row forms are allowed to cross parts freely and several different forms are used. (Example 12.)

Example 12.



Although repetition of notes is not found within the basic form of the set, a note may be repeated within the framework of a motive or theme. Such a repetition may be characteristic of a musical idea, as in the theme of Schoenberg's fourth String Quartet. For purposes of sonority a chord, or note, may require repetition in the form of trills, broken chord patterns, ostinati, or tremolo patterns.[7] Musical context will determine the use of these repeated materials.

Doubling of lines is possible but Schoenberg recommends that doublings at the octave be avoided. He states,

> to double is to emphasize and an emphasized tone could be interpreted as a root or even a tonic, the consequences of such an interpretation must be avoided. Even a slight reminiscence of the former tonal harmony would be disturbing.... The use of a tonic is deceiving if it is not based on all the relationship of tonality.[8]

Schoenberg believed the row could be used as a substitute for tonality. In an article about his compositional development he explains how this is possible:

> Coherence in classical composition is based -- broadly speaking -- on the unifying qualities of such structural factors as rhythms, motifs, phrases and the constant reference of all melodic and harmonic features

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[7] An example of the use of repeated notes is found in example 9 on page 29.

[8] Schoenberg, Style and Idea, p. 108. It is interesting to note that in some later works of Schoenberg, and in almost all the compositions by Berg, this avoidance of the reminiscences of tonality is not closely observed.

> to the centre of gravitation -- the tonic. Renouncement of the unifying power of the tonic still leaves all the other factors in operation.[9]

The Variations for Orchestra, Op. 31, clearly show how Schoenberg used a row in combination with the other traditional factors of coherence. The row provides the musical and thematic materials which are used within classical formal structures. The composition consists of an introduction, theme and nine variations, and a finale. The introduction is used in a traditional way, it sets the tone and mood of the piece and states certain fragments of the rows which are to be used in the subsequent theme and variations. In the introduction the rows are never fully stated, appearing only as melodic fragments. For example in bars 16 and 17 the first four notes of the prime set are thematically stated by the oboes; the flutes and E flat clarinet reply with a theme which is derived from the first four notes of the inverted prime set. The themes are rhythmically the same, strengthening their relationship. The introduction also emphasizes certain intervals which are prominent in the row. In the opening, clarinet, bassoon and harp state augmented fourths and diminished fifths in sonorous broken patterns. These are followed by a reiterated second, then a similar pattern using a minor third. The passage gradually introduces the intervals of the row. (Example 13.)

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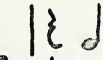
[9] Arnold Schoenberg, "My Evolution," Musical Quarterly, 38 (October, 1952), p. 524.

Example 13. Schoenberg, tone row from the Variations for Orchestra.

The first eight bars of the work are based entirely on the presentation of these intervals. At bar 9 a fragment of the inverted set on the ninth transposition appears in the bass clarinet, bassoon and double bass parts. Bars 9-23 introduce several new rhythmic ideas and the intensity is increased by a thickening of the texture. At bar 24 Schoenberg introduced a new element, the motive, B-A-C-H. The motive is placed in the middle register of the first trombone and it is obvious from the sparse accompanying texture-- flute, English horn, and cello --that Schoenberg meant this motive to be clearly heard. The motive is used throughout the remainder of the work as both a thematic and an accompanying element. It appears in many of the variations, as in the second variation at bar 99 where it is heard in diminution in the first trombone, or in the eighthvariation at bar 262 where it is used as part of the motive played by the oboes. It is particularily prominent in the finale where the motive is used as the main theme and completely permeates the texture of the movement. The introduction closes in a manner similar to the beginning, with a return of the reiterated seconds

and fourths. The concluding chord is built in fifths, perfect and diminished.

After a pause, the main statement of the variation theme is heard in the cello, with a quiet chordal accompaniment. The theme is based on four forms of the row, and has a ternary structure. The first section, bars 1-12, consists of an antecedent phrase, bars 1-5, derived from the prime set, and a consequent phrase, bars 6-12, derived from the retrograde inversion on the ninth transposition. The middle section, bars 13-17, provides contrasting material both rhythmically and thematically. It is derived from the retrograde form of the row. The final section, bars 18-24, present an abbreviated form of the opening section. The conclusion is based on the inverted form of the prime set in the ninth transposition. The rhythmic shape of the original statement is retained but the intervallic structure is changed. Despite these changes there is enough of a motivic resemblance to the opening theme to convey the idea of a thematic recapitulation. The theme, then, is a different statement of the row in several forms. To maintain its motivic identity the rhythmic structure of the theme becomes a primary attribute. In the variations, different aspects of the row and its rhythmic elements are developed.

The first variation is mainly rhythmic in its development. The  figure of the theme is changed to . The composer used the prime set and doubled the line with the third transposition of the set. The result

is a theme moving in minor thirds and majors sixths. Unity in the variation is achieved through rhythmic uniformity, and by the motivic and harmonic use of the intervals of the first hexachord of the inverted row. Bars 62-68 illustrate particularily well the motivic development of the structure of an augmented fourth, minor third and a major second which derives from the first four notes of the prime set. This motive is extensively used in these bars and is used to conclude the variation.

The second variation is contrapuntal and is written for solo players. It derives its material from an inversion of the theme. The variation uses two row forms and several transpositions. The varied theme is stated in canonic imitation between the solo violin and oboe. The first two bars of this variation illustrate the principle of combinatoriality. For this variation Schoenberg has chosen the prime set and the inverted set in its third, sixth and ninth transposition. The opening one and one-half bars use the prime set and the ninth transposition of the inverted set. These two row forms are combinatorial, meaning that the first hexachord of the prime set and the first hexachord of the inverted set do not contain any duplicated notes. The result of using this structure is a statement of all the notes of the chromatic scale in the first one and one-half bars of the variation. The prime set is in the first flute and bassoon, while the transposed inversion is in the bass clarinet and solo violoncello. By using the combinatorial

row forms Schoenberg is assured of the maximum statement of the chromatic scale. Through these statements he is able to achieve the equal use of all the notes of the chromatic scale. The use of these thematic elements in various transpositions throughout the variation impart a unity of thematic elements. The return of the theme gives a ternary outline to the form. Again, the rhythmic return further helps to identify the thematic fragments within the form.

In Schoenberg's twelve-tone compositions, including the Variations, rhythm has a specific formal function and is used in several ways. First, it can appear as an independent rhythmic motif, second, as one part of the thematic material, or third, as a means of phrasing. These factors may appear in combination with a theme or may be used as separate thematic elements. If used as separate thematic elements the rhythmic ideas are then treated in a manner similar to that used for thematic motives, and may appear throughout the composition to add to the unity and coherence. This use of rhythm adds a new dimension to Schoenberg's compositions.

Another use for the row is in an accompanying part, as in variations IV and VI. In both these variations the main themes are not extended statements of a row form, but the row is used as an accompanying figure. In variation IV the row is heard in the harp and mandolin in a repeated sixteenth-note figure. The theme in the flute is derived from an inversion of the prime set used in a fragmented

pattern. The sixteenth note accompaniment acts as a unifying thread running through the entire variation. In the sixth variation a similar pattern is employed. The solo first violoncello has the prime form of the set, and it is heard as an accompaniment to the main woodwind theme, which is a composite of row forms.

Structurally, the Variations follow traditional forms and conventions. The ternary form is the most common, although binary patterns are also employed, as in variation VIII. One double variation - variation VI - is used. Phrase structures generally follow traditional plans in that Schoenberg used antecedent and consequent phrases, but these are adapted to the twentieth-century idiom through the use of asymmetrical lengths. For example, variation V begins with two five-bar phrases, variation VI opens with a six-bar phrase answered by a five-bar phrase. Within this basically traditional structural framework Schoenberg used the row as one of his main unifying elements. The most obvious aspect of this is the thematic statements of the row. These themes supply aural repetition of the row in recognizable forms, and as observed in the introduction, repetition is one of the most basic elements in the establishment of unity. The row not only gives thematic unity, it also provides a basis for harmonic uniformity. The harmonies are derived from the row. The accompaniment to the initial statement of the theme establishes different harmonic configurations which are later used. For example, the vertical minor third which

appears in variation I, is part of the accompanying chords of the introduction, bars 34 and 35. Thus the row is used as a means of providing most of the musical material for the composition. Other elements have an important role in the Variations, particularily the B-A-C-H theme and the treatment of rhythmic motives, but it is through the combination of these elements with the various repetitions of the row that both aural and theoretical unity are achieved.

The fourth String Quartet by Schoenberg is also strictly written according to the twelve-tone system. This work, completed on July 26, 1936, was a commission from the Elizabeth Sprague Coolidge Foundation, and was first performed by the Kolisch Quartet. In this piece the same principles which dictated the development of the Variations are evident. One row in its various forms is used throughout and combinatorial row forms assure equal exposure of the chromatic scale. A traditional form, the sonata, guides the structural requirements of the first movement. Several row transpositions are used. For example the theme of the third movement is a statement of the prime set in its tenth transposition. As in the Variations, the row provides thematic materials which are used throughout and give unity to the piece. The row also provides the harmonic structure, as can be seen in the opening of the first movement. The prime set is stated in the first violin and is also used to derive the chords of the accompaniment to the violin theme. This organization of the row into both thematic and accompany-

ing materials is an application of Schoenberg's theory of the unity of musical space. With this theory Schoenberg recognized that "the elements of a musical idea are partly incorporated in the horizontal plane as successive sounds and partly in the vertical plane as simultaneous sounds."[10] This realization led him to explain that the basic set could be integrated into either dimension or into a combination of the two areas.[11] It is this integration of the row into both strata of the String Quartet, Op. 37, and the highly compact thematic use of the row in that work which led Rufer to conclude, "it can be clearly seen to what a great extent these direct motivic connections (and also indirect ones caused by splitting up the series) contribute to the unity of the musical structure."[12]

The String Quartet and Variations are also exemplary of Schoenberg's belief in the possibility of using classical elements outside of the traditional harmonic structures. As mentioned, the formal phrase structure and the formal designs of these works are strongly traditional. The basic motivic development also has a classic foundation. The idea

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[10] Schoenberg, Style and Idea, p. 109.

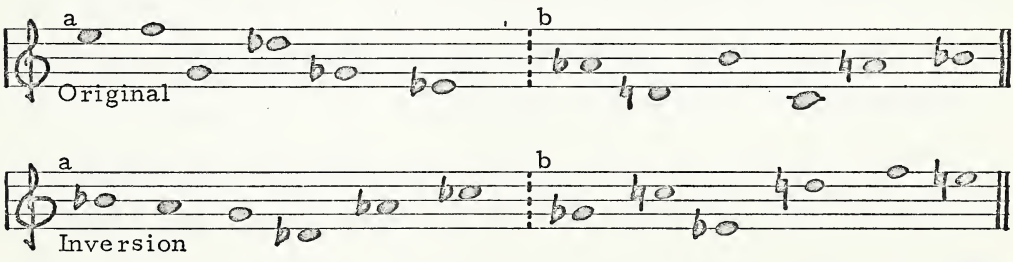
[11] Ibid.

[12] Joseph Rufer, Composition with Twelve Notes Related Only to One Another, trans. by H. Searle (London: Rockliff, 1965), p. 146.

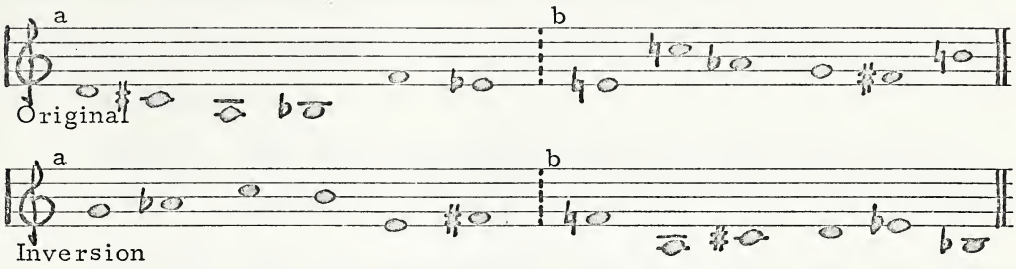
of theme and variation is an old one, and Schoenberg used it as a departure point for his concept of perpetual variation.

As previously mentioned, both the Variations and the String Quartet, Op. 37, contain combinatorial row forms. More may be said about their construction and importance as row structures in Schoenberg's later compositions. This type of hexachordal organization appears in most of Schoenberg's late works. One of the earliest uses was in the Suite, Op. 29. The device is based on the interchangeability of hexachords between different row forms. A comparison of the row and its inversion of the Piano Suite, Op. 25, (example 14) with the row and inversion of the String Quartet, Op. 37, (example 15) will illustrate the principle. (Examples 14 and 15.)

Example 14. Schoenberg, tone row and inversion from Piano Suite, Op. 25.



Example 15. Schoenberg, tone row and inversion from String Quartet, Op. 37.



In example 14 the first hexachord of the original and the first hexachord of the inversion contain duplications of the notes G and D flat. The second groups also contain duplicated notes, C and D. This means that it is not possible to combine the hexachords of the two rows and still have a complete statement of the chromatic scale. In example 15 the row is constructed with interchangeable hexachords, meaning that the hexachords O_a and I_a, or O_b and I_b can be combined to give a complete twelve-note series. Rochberg, in a study of this particular area of row construction, has concluded that "this peculiarily characteristic organization based on interchangeable six-note groups or hexachords is neither haphazard, nor accidental, nor even a coincidence; but rather an integral part of the plan of the series itself."[13] The study goes on to show how this type of relationship is only possible under certain clearly defined circumstances of interval relations and structure. It was found

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[13] George Rochberg, The Hexachord and Its Relation to the Twelve-Tone Row (Bryn Mawr, Pa.: Presser, 1955), p. 3.

that interchangeable hexachords resulted only if the row followed certain rules in its construction. Rochberg gives the following rules:

> Rule 1. Any one horizontal interval plus the mirror interval (or point of inversion) cannot equal 12 (or a multiple of 12).
>
> Rule 2. Any two horizontal intervals plus the mirror interval cannot equal 12 (or a multiple of 12).
>
> Rule 3. Any double one interval plus the mirror interval must not equal 12 (or a multiple of 12).[14]

Failure to comply with any of these rules will result in a duplication of notes and the hexachords will no longer be interchangeable.

In Schoenberg's later works the use of rows with interchangeable hexachords became an important structural element. Because of the interchangeability of the groups there is more freedom in the choice of note order. It is also possible to use simultaneous row forms without incurring numerous note duplications. The second variation of Op. 31 shows how Schoenberg made use of this technique. Another structural aspect of these rows which Schoenberg used was the possibility of inversion at the perfect fifth. The String Quartet, Op. 37, the Piano Concerto, Op. 42, and the Violin Fantasy, Op. 47, all use this relationship. It is used in a manner similar to the tonic-dominant relationship of traditional music, in so far as two different row forms be-

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[14] Ibid., pp. 25-27.

come associated through their juxtaposition in the work and thus establish a set of relationships valid for that composition.

Another interesting aspect of Schoenberg's later works is his occasional relaxed approach to the serial technique. His early admonition against tonal implications was in some instances ignored as he returned to writing some tonally oriented works.[15] Although this represents a change in viewpoint from earlier statements it does not present a radical stylistic change in his compositional techniques. Even in these works, as Glenn Gould observed, "the prevailing triadic course of this music is arranged not according to the respect of tonal voice-leading but is derived out of a twelve-tone principle furnished by using a row which favours division into triadic groups."[16] In these works Schoenberg used techniques of melodic construction, motivic development and row juxtaposition similar to those in his earlier works but now because of the triadic content of the row, he is able to develop areas of tonality, and to use triads in his harmonic structure. In these works the sense of unity is derived partially from the tonal implications and partially from the recognition of the row relationships.

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[15] Some of these tonal works are Kol Nidre, Ode to Napoleon, and the Variations on a Recitative.

[16] Glenn Gould, Arnold Schoenberg: A Perspective (Cincinnati: University of Cincinnati, 1964), p. 15.

Certain characteristics in Schoenberg's treatment of his row can be observed. The row is used within the framework of traditional elements in areas such as thematic development, phrase structure and sectional divisions. Combinatorial row structures are favoured. Rhythm is used to emphasize row features in the different themes but is also treated as a separate motivic portion of the composition. Although many other factors, such as instrumentation, texture and use of instrumental tone colour, effect the unity of Schoenberg's compositions, this examination of his use of a tone row has shown that the row is a main factor in the establishment of musical unity within a composition. This unity is dependent to a large extent on the recognition of the motivic elements drawn from the row, and thus upon a recognition of the row itself. The row has an important role both thematically and structurally. In instances where the theme and the row are synonomous, recognition of the row becomes an obvious unifying element. Even in instances where the row and the theme are not synonomous, and therefore not as easily recognized aurally, the row is still a strong constructive element.

CHAPTER III

TWO SCHOENBERG PUPILS
ALBAN BERG AND ANTON WEBERN

Arnold Schoenberg's musical activities were not limited to composing. He was active in the promotion of contemporary music and he also taught a number of students. Two of his pupils, Alban Berg and Anton Webern, were exceptionally talented. Both of these men became close friends of Schoenberg and they were leaders in the struggle for the recognition of his work. While they actively advocated the ideas presented by Schoenberg and adopted his method of composing with twelve notes, the final result in their works was a style very different from that of Schoenberg. Berg and Webern each developed a personal idiom which used the serial techniques but which was also uniquely expressive of their own individual identities.

Alban Berg

Berg was born in Vienna in 1885. His father was an export merchant and bookseller; his mother a talented painter and musician. He had always been interested in creative activities and in a letter to Webern dated July 18, 1914, he wrote, "Before I started to compose I wanted to become a poet.... And, further back still as a child I used to

paint and draw..."[1] Berg began his study of composition with Schoenberg in 1904. Schoenberg remembered him as "a very tall youngster and extremely timid."[2] Berg continued his studies with Schoenberg until 1911.

Berg's mature musical technique was based on a free use of a tone row. This technique combined elements of tonality, expressionism, and perpetual variation, with a free treatment of a serial tone row. In some cases he used no row, but relied on thematic references to give his work coherence.

The Lyric Suite is a work typical of Berg's treatment of a tone row as a musical unifying element. The work contains sections in both strict twelve-tone technique and in free atonal style. It was composed in 1926 and has six movements of contrasting moods and tempos. Throughout the entire work the influence of the row can be heard, even in the free atonal sections. The movements are linked through the use of related tone rows and motivic materials.

The first movement begins with a series of chords which "function... to serve as source for the dodecaphonic development of the rest of the movement."[3] The chords con-

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[1] Quoted in Hans Redlich, Alban Berg (London: John Calder Ltd., 1957), p. 225.

[2] Ibid., p. 245.

[3] Ibid., p. 136.

tain all the notes of the chromatic scale and so it is not difficult to think of the row as an ordering of these opening chords. The tone row, which follows immediately, is clearly stated in the first violin as a thematic idea. (Example 1.)

Example 1. Berg, Lyric Suite, bars 2-4.

The accompanying parts provide the harmonic background for the theme. The notes are derived from the basic set and they form triads, which are used non-functionally. The dissonances between theme and accompaniment give tension to the work. The cello theme of bars 4 and 5 acts as a link between two statements of the opening theme. Berg has chosen the retrograde inversion of the row for this link. The second entry of the first theme is treated in canonic imitation amongst the four parts beginning in the first violin. In

keeping with Schoenberg's principle of perpetual variation, the theme is slightly changed but the relationship between the two thematic statements is obvious. The row is now used beginning on its ninth note, but the original rhythmic pattern is maintained and the melodic contour is similar.

The second theme, which appears in bar 23, is derived from the first five notes of the prime set and the first eight notes of the retrograde inversion. The accompanying figure is based on the retrograde row. The remainder of the movement is a development and transformation of these initial themes. The form is an abbreviated sonata-allegro shape but the development section does not exist as a separate entity within the work. This is because both the exposition and recapitulation are developmental in character. The recapitulation, beginning at bar 36, presents the material in the original order, but the themes are transformed.

Berg used several row transpositions throughout the movement. For example, at bar 18 the inverted row is used simultaneously in four forms: the original set inverted, the sixth, the ninth, and the third transposition. He also used transposed versions of the prime set, as at bar 28, where the sixth transposition of the row appears in the first violin part. By using these various row forms Berg achieved an intervallic unity throughout the movement which in turn gives an aural reference to the initial theme which is derived from the row.

The second movement, Andante Amoroso, is written in a

free atonal style, but the influence of the first movement row is evident. The most obvious link is the close correspondence of the second subject of the second movement, bars 16-23, to a portion of the second subject of the first movement, bars 23-25. The texture, and prominent intervals, such as the augmented fourths and minor sixths, also relate to the row of the first movement. It is, in fact, difficult to distinguish stylistically between the movements written in free atonal style, and those, like the first movement, which are written in twelve-tone style. This can be partially attributed to Berg's choice of row structure. The row used for the first movement allows Berg to write in his characteristic manner. Two of these characteristic traits are the use of a fourth as an important melodic and structural element, and the use of the seventh as a source of tension. Both of these factors are present in the row and are exploited in the subsequent development of the movements.

The third movement, Allegro Misterioso, is written in the twelve-tone idiom. The row used is a variant of the row of the first movement. It appears throughout the movement in many transpositions. The development within the movement takes the form of contrapuntal and rhythmic variations on the row.

The trio section of the movement is a free rhapsodic form. It has a dual function in that it is a contrasting section for the third movement while also stating several

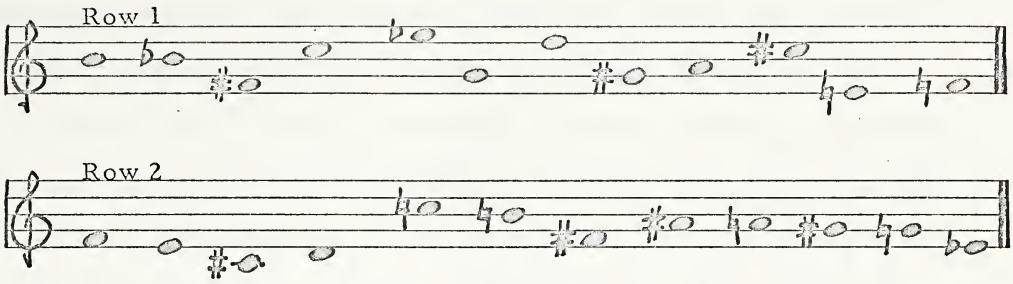
motives used in the fourth movement. The trio is not strictly twelve-tone, but again the row is influential in the thematic and intervallic structures used. At the return of the Allegro, the entire first section is heard in a retrograde version. Although this structure is difficult to hear initially, it unifies the movement through a type of thematic recapitulation.

The fourth movement is not twelve-tone and is based primarily on material from the trio of the third movement. Formally, the fourth movement is a loose two-part structure, each section being of a developmental character. The second section is a further elaboration of the first part, and also introduces the theme which begins the fifth movement.

The fifth movement, marked Presto Delirando, is a five part form consisting of a recurring scherzo with two trios. The Tenebroso, the first trio, uses a series also heard in the sixth movement. This series is a derivative of the row used in the third movement which in turn relates to the row of the first movement.

The sixth movement is a Largo with a free formal plan using only vaguely defined sections. Two related rows are used throughout the movement. (Example 2.)

Example 2. Berg, tone rows from sixth movement of the Lyric Suite.



The relationship of the rows lies in the fact that the retrograde inversion at the sixth transposition of row 1 and the original version of row 2 have common notes. A further relationship between the rows is found if row 2 is inverted. By superimposing the two hexachords of the inverted row upon one another, row 1 in its original version is formed. Each of the rows has previously appeared in the Suite. Row 1 appeared in the Tenebroso of the fifth movement, while row 2 appeared in the principal section of the fifth movement. Both are used equally throughout the movement in a variety of forms.

The Lyric Suite shows clearly how a row can be used to unify a composition. From the initial row of the first movement, the basic material for the Suite is evolved. The modifications and developments of the row dictate the overall structure and tonal elements. The intervallic content of the harmonies and the thematic elements also derive from the row. Other works by Berg use a row as a unifying element, but these generally treat the row in a freer manner.

Berg's later works, especially Lulu, and the Violin

Concerto explore the use of a row "to create the possibilities of tonal functions within the total resources of chromaticism."[4] Early evidence of this tendency appeared in the concert aria, Der Wein. In this piece the row has thematic and structural functions, both of which are used simultaneously to create a compact unity throughout the work.

The Violin Concerto, written in 1935, combines further the traditional concepts of thematic unity with a row structure and areas of tonal implication. The row is used in different ways.[5] As a thematic element it is stated in the solo violin's opening statement. Certain structural features of the row, such as the internal triads, appear throughout the composition, but not necessarily in a serial context. The tonal possibilities inherent in the row are developed throughout the work. The row also helps to generate the mood of the composition.

Formally, the concerto follows broad traditional outlines. The first movement is in two sections: a three-part Andante, and an Allegretto, consisting of a Scherzo with two trios. The second movement also has two sections: an Allegro followed by an Adagio. The Adagio section contains varia-

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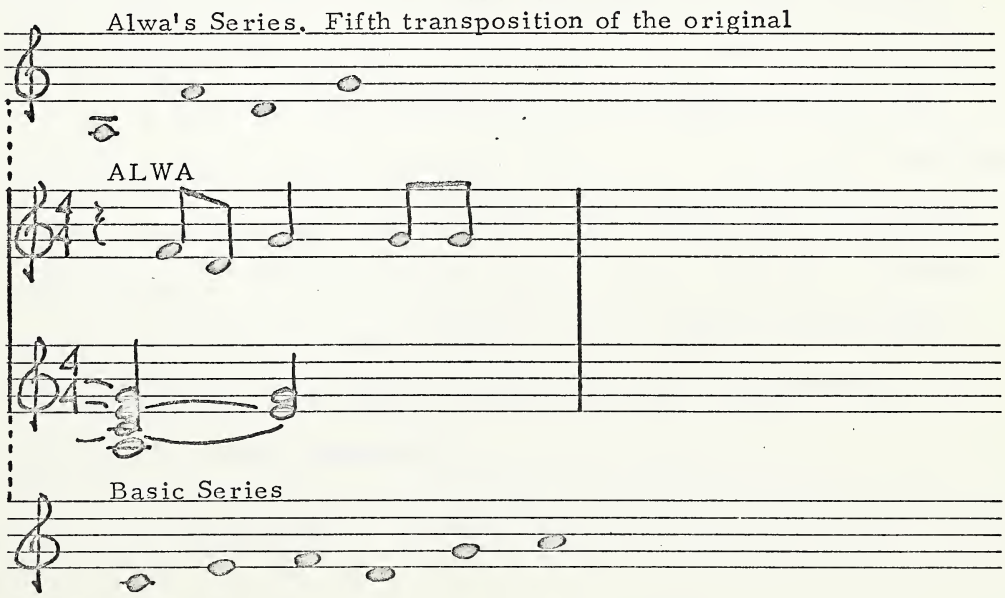
[4] René Leibowitz, Schoenberg and his School, trans. by Dika Newlin (New York: The Philosophical Library, Inc., 1949), p. 162.

[5] The row for the Violin Concerto can be found in Chapter II, example 4, page 25.

tions on a chorale melody. The movement concludes with a reminiscence of the violin theme of the first movement, followed by a brief coda. In this concerto the row is not treated strictly, but its general structural characteristics help to determine the style in which the composition is written.

In Berg's last opera, Lulu, a new aspect of row usage is introduced. Several rows are used, each of which is associated with a specific character of the opera. Through juxtaposition and integration of the various rows, dramatic and ironic effects are achieved. Berg also liked to exploit similarities between rows to gain these effects. One example of this can be found in Act I, Scene 1 of Lulu. When Alwa enters, the first four notes of the series associated with him are heard. (Example 3.)

Example 3. Berg, Lulu, Act I, Sc. 1.



In this example, Berg has really used the three notes of the basic set which are also a part of Alwa's row. Through these procedures Berg is able to link his musical materials to the dramatic and literary aspects of the play. The opera thus has a musical structure which heightens and supports the dramatic qualities of the play. The row unifies the musical structure through obvious thematic links and also through subtle formal functions.

It can be concluded that Berg used his rows to help give unity to his compositions. He moulded the row to fit his particular mode of expression. Berg consistently followed Schoenberg's principle of perpetual variation, but he also maintained a contact with tradition through his use and treatment of tonally oriented rows and traditional formal structures. In many cases the row was a factor in determining the structure and style of a composition, but it in no way changed the basic stylistic features of Berg's music. Two of these features were the use of the fourth as an important interval, both melodically and harmonically; and the use of the interval of the seventh as a source of tension. These are characteristics of both his serial and non-serial compositions. In the serial works, these intervals became part of the initial row structure, and, because they were integrated into the fabric of the various compositions, no stylistic changes appeared.

Anton Webern

Webern was born in Vienna in 1883. His father was a mining engineer in the civil service. In 1893 the family moved to Klagenfurt where Webern received his first music lessons. In 1902 Webern returned to Vienna where he began to study music history and musicology with Guido Adler. Having unsuccessfully applied to study with H. Pfitzner in Berlin, Webern began studying in Vienna with Arnold Schoenberg in 1904.

The music of Anton Webern presents a rather sharp contrast with the music of his fellow student, Alban Berg. Webern's music has been described in many ways, but perhaps its most immediately striking feature is its conciseness. Eimert describes the style thus: "Webern speaks a musical language of exactness, firmness and inner hardness... of expressive sensibility and the most minute formal exactness."[6] This "formal exactness" is achieved through the use of a serial tone row, and of complex canons.

In the course of his work Webern adopted the most radical and forward facing elements of Schoenberg's philosophy. These elements were the ideal of strictness and economy of musical materials, and the purity of musical sound. Schoenberg did not believe in using tone colour as an effect. He writes:

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[6] Herbert Eimert, "A Change of Focus," trans. by L. Black, Die Reihe, II (1959), p. 31.

> The childish preference of the primitive ear for colours has kept a number of imperfect instruments in the orchestra because of their individuality. More mature minds resist the temptation to become intoxicated by colours...[7]

Webern's early compositions, those early student works without opus numbers, and opera 1 and 2, were written in a classical-romantic form while using a sound and expression initially based on the language of Reger, Mahler, and Strauss. Leibowitz claims that even at this early stage, Webern was trying "to derive an abundance of thematic forms from the least possible musical material in the smallest possible space, while at the same time holding all these forms to a strict unity...."[8] The Passacaglia, Op. 1, reveals some traits which become typical of Webern's more mature style: the predominant dynamic level of ppp, discreet thematic presentation interrupted by rests, and subtle use of the orchestra through unusual instrumental combinations. This is perhaps what Leibowitz was referring to in his statement quoted above. Even though the Passacaglia has these traits, it must be understood that it is still very traditionally oriented, and its method of achieving unity and coherence follow traditional paths. The work is based on a theme and not in any way on a row structure. Kolneder thinks it possible "that Webern took the finale of Brahms'

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[7] Arnold Schoenberg, Style and Idea (London: Williams and Norgate, 1951), p. 131.

[8] Leibowitz, Schoenberg and his School, p. 190.

Fourth Symphony as the starting point for his conception of an orchestral passacaglia."[9]

During the fifteen years following the writing of the Passacaglia (1908-1923) Webern adopted the twelve-tone method. The adoption of the technique was gradual and was a natural part of Webern's development. The first works which explored some of the possibilities of a row were the vocal works of opera 17, 18 and 19. The three songs of Op. 17, written in 1924, are not entirely written in the twelve-tone idiom but they do use some row structures. Certain characteristics, such as ostinato figures and note repetitions, are retained as connecting forces and unifying links within the works. The first song uses eighteen twelve-note groups; some of these groups are incomplete and others are altered. The second song employs techniques similar to the first, using twenty-three twelve-note groups all of which maintain the basic order of the set. The following example shows the row used in the song. (Example 4.)

Example 4. Webern, tone row from Op. 17, no. 2.

[9] Walter Kolneder, Anton Webern, trans. by H. Searle (Los Angeles: University of California Press, 1968), p. 27.

The third song uses chains of twelve-note groups as did the previous two songs. The voice part follows the basic series which is repeated four and a half times. Webern systematically used short motifs derived from segments of the series. Eimert summarized the developments of Op. 17, saying, "Webern's transition to twelve-note technique in Op. 17 does not mean a change in technique or even in style, but represents a completion of his technical means."[10]

Op. 18, also a set of three songs, enlarges the row materials used. The inversion, retrograde and retrograde inversion of the series all appear, but this does not produce any aurally appreciable difference in Webern's musical language. The second song of Op. 18 produces some interesting relationships between text and the series. Baldenius writes:

> The handling of the series and its other forms is here conditioned by the text. The three characters who speak in the poem, the Virgin Mary, Christ and God the Father each have their own form of the series: Mary has the basic series, Christ in the dialogue with Mary the inversion of the series, in the dialogue with the Father a transposed retrograde inversion with the order of the notes somewhat freely arranged (RI 11), and the Father in the dialogue with Christ has the retrograde of the basic series...[11]

In this second song the role of the tone row is becoming increasingly important as a constructive, and thus unifying element, in the composition.

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[10] Eimert, "A Change in Focus," p. 33.

[11] Quoted in Kolneder, Anton Webern, p. 105.

In the two choral songs of Op. 19 Webern tried to use the row in a different manner. The notes are spread over a relatively long time-distance, which is then shortened with each independent entry. The interest in time-distance presents problems in the balancing of tensions within the music and is a problem Webern tried to solve in many of his succeeding compositions.

The String Trio, Op. 20, written in 1927, marked the complete development of Webern's twelve-tone technique. Speaking of the trio, Metzger writes, "Webern's new conception, completely developed, appears for the first time in the String Trio: accordingly, it is the first of his works which cannot be followed harmonically and melodically in the traditional way."[12] The trio is in two movements and "marks a return to larger forms"[13] from the preceding instrumental miniatures and the eight vocal opera. Webern believed that it was Schoenberg's twelve-tone method which made these compositions a reality. "Only after Schoenberg pronounced the law, did larger forms become possible again."[14]

The trio is based on a single series. (Example 5.)

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[12] Heinz-Klaus Metzger, "Webern and Schoenberg," trans. by Leo Black, Die Reihe, II (1959), p. 44.

[13] Leibowitz, Schoenberg and his School, p. 206.

[14] Anton Webern, Path to the New Music, ed. by W. Reich, trans, by Leo Black (Bryn Mawr, Pa.: Theodore Presser, 1963), p. 54.

Example 5. Webern, tone row from the String Trio, Op. 20.

This series is dominated by semitonal relations, forming a large number of two-note motifs, and arranged in a complex system of minor seconds. Thus the second became an important horizontal and vertical interval. The series is used throughout the entire work in various sequences which weave the different row forms together. The parts are not heard as individual lines but rather present a sound picture of wide leaps and register changes, constantly crossing parts, changes between arco and pizzicato in the string parts, and interruption of all parts by rests. The total aural effect compels the listener, "to perceive the music as a proportioning of sound."[15] To unify the work Webern developed a seven-bar theme which, used as a rondo theme, appears four times in the first movement. The theme does not follow any one row form but is derived from the retrograde inversion, eleventh transposition of the inversion, and the original row forms. The theme is used within the framework of a classical rondo form but as Stravinsky remarked, "the music

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[15] Metzger, "Webern and Schoenberg," p. 44.

is marvellously interesting but no one could recognize it as a Rondo."[16] The manner in which the theme is varied on each return, makes the rondo difficult to recognize aurally. The unity of the work lies in the pervading influence of the row which permeates the structure. The complex contrapuntal texture further heightens the aural difficulties of the work. The piece was not widely accepted, and at the London performance in April 1938, the cellist declared, "I can't play this thing" and walked off the platform.[17]

In the compositions following the Trio, Webern derived more and more of his composition from the row. The row structure is itself determined largely by a desire to create as many internal relationships as possible. These relationships are then developed within the composition. Because the elements of the piece have originated in a single source, the tone row, unity is achieved by the constant reference to this source.

The Symphony, Op. 21, is one of the first works to exploit these internal relationships. The row is constructed so that the two halves of the row have the same interval content, they are mirror forms of one another. The series provides a number of motives within its structure and ex-

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[16] Igor Stravinsky, "Neue Dialogue: Igor Stravinsky--Robert Craft," Melos (1958), p. 264.

[17] Webern, Path to the New Music, p. 58.

tensively uses the semitone. Both movements of the work are based on this row. (Example 6.)

Example 6. Webern, tone row from the Symphony, Op. 21.

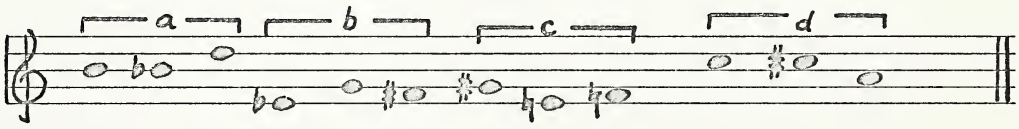
Acting as a prelude to the second movement, Theme and Variations, the first movement begins with a highly complex double canon in contrary motion. It moves through nine different instruments and uses four row forms: the original, the inverted, the second transposition of the retrograde inversion, and the tenth transposition of the retrograde. The strict canonic structure of the movement is difficult to hear as the canon is distributed throughout the instruments. The theme is based on two statements of the row. The melody in the clarinet is based on the prime set while the accompaniment, provided by the horns and harp, uses the retrograde form of the set. This structure gives the widest possible exposure to the row because both melody and accompaniment have the same intervallic content. The variations use various row forms, and employ a freer treatment of serial methods than in earlier works. Webern described some of the variations in a letter to W. Reich:

> ...the first variation is in the melody, a transposition of the series starting on C. The accompaniment is a double canon. --Greater unity cannot be achieved

> ....In the fourth variation there are constant mirror forms. This variation itself is the central point of the whole movement, after which everything goes backwards. So the whole movement, itself a double canon by retrograde motion.... As many connections as possible were to be created...[18]

The Concerto for Nine Instruments, Op. 24, continues the trend towards a closer-knit structure. The row used for this work contains many relationships within itself. An examination of the row reveals that it is divisible into four, three-note motivic units, each related to the other. (Example 7.)

Example 7. Webern, tone row from the Concerto, Op. 24.



Motif "b" is a retrograde inversion of "a," motif "c" is the retrograde of "a," and motif "d," the inversion. The motif "a" appears as a motto at the opening of the work and is followed by the remaining motifs. (Example 8.)

Example 8. Webern, Concerto, Op. 24, bars 1-3.

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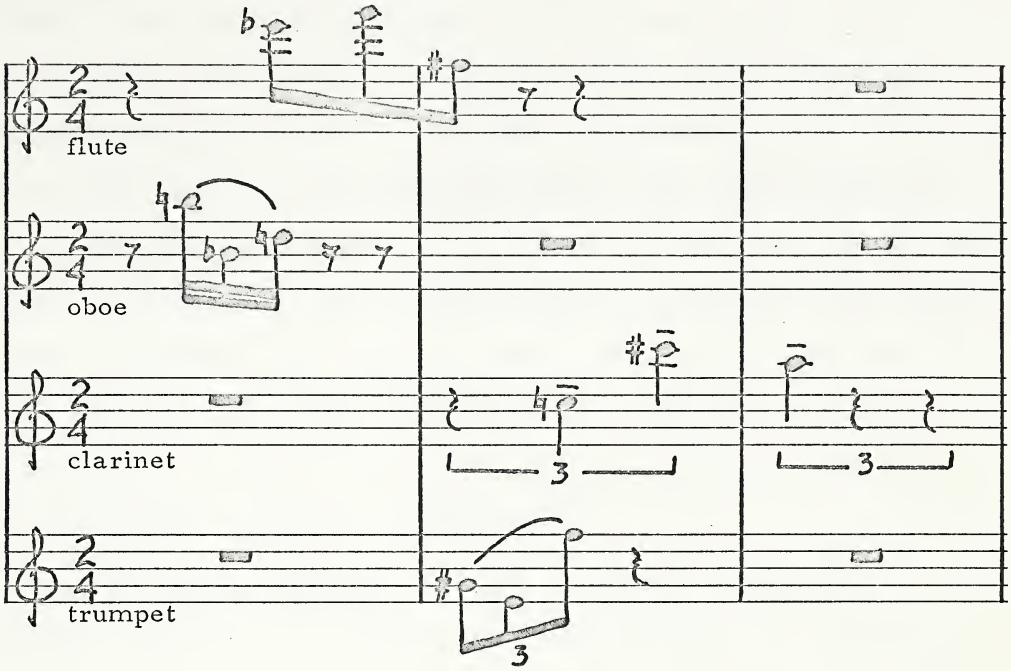
[18] Webern, Path to the New Music, p. 56.



Throughout the course of the composition the three-note motif is perpetually varied, but still remains recognizable. This motivic use of the row is the prime unifying element throughout the Concerto.[19] Kolneder concludes, "The whole work is developed from a single three-note motif; Schoenberg's idea of the greatest possible unity is here thought through to its final implications and realized in a composition."[20]

The remaining works of Webern continue to use the row as the basic source for the sound materials of the composi-

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[19] A complete analysis by K. Stockhausen of the first movement of Op. 24 is found in Melos (1953), p. 343.

[20] Kolneder, Anton Webern, p. 136.

tions. The Piano Variations, Op. 27, present the series as a theme, the design of which is based on the principles of Spiegelbild, or mirror imaging. Leibowitz claims "the structure results from the handling of the twelve-tone row. The scheme is as follows: first segment, original and retrograde superimposed; the second segment, inversion and retrograde inversion superimposed; third and fourth segments, repetition of the same conditions."[21] This results in a presentation of the four untransposed versions of the row in the initial thematic statement.[22]

The String Quartet, Op. 28, further illustrates Webern's practice of basing his compositions on a single row, constructed with many internal relationships. Leibowitz has demonstrated the numerous relations found in the row.[23] (Example 9.)

Example 9. Webern, tone row from the String Quartet, Op. 28.

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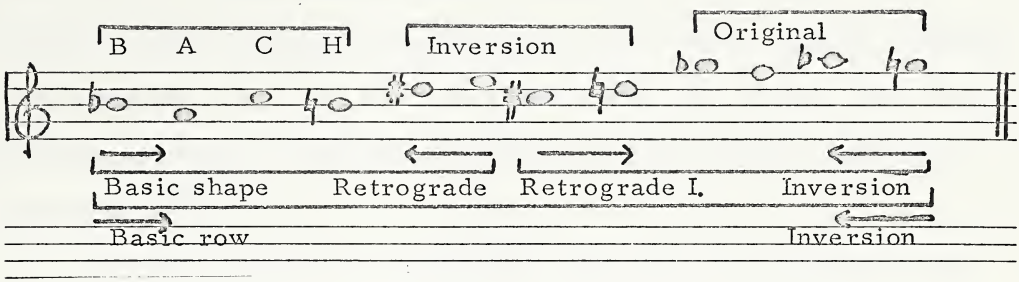
[21] Leibowitz, Schoenberg and his School, p. 232.

[22] An analysis of the complete Variations, Op. 27, is found in Leibowitz, Schoenberg and his School, pp. 228-240. Two different analyses of the second movement of Op. 27 are provided by Wilber Ogden, "A Webern Analysis," Journal of Music Theory, 6 (1962), pp. 133-138; and Peter Westergaard, "Webern and Total Organization," Perspectives of New Music, Spring (1963), pp. 107-120. The third movement has been analyzed by Armin Klammer in Die Reihe, 2 (1959), pp. 81-92.

[23] Leibowitz, Schoenberg and his School, p. 242.



Through these numerous relationships, an effect of organic development is achieved. The second and third movements of the Quartet are built through the layering of row forms. For example, in the second movement, the sixth transposition of the inversion, the first transposition of the original, the tenth transposition of the inversion, and the ninth transposition of the original are used in the violin I, II, viola, and cello respectively. As well as this layering of the row forms, Webern also makes use of row similarities to overlap row forms so that the B-A-C-H motive does not appear twice in close juxtaposition. An example of this overlapping is found in the opening twelve bars where the original, the eighth, and the fourth transpositions of the original, and the original are, in the preceding order, all linked through overlaps. Certain critics have found the Op. 28 to be a cold, symmetrical presentation of a series lacking in musical form.[24] Eimert presents the more favourable view that,

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[24] T. Adorno and Rudolf Stephen have both commented on Webern's seemingly mathematical approach to the music of Op. 28.

especially in the opening bars, "Webern gives a perfect example of his interval technique... in a form almost reduced to a formula. It is as if he were going out of his way to present us with a blueprint of the essence of his interval technique."[25]

Webern's interval technique and his increasingly complex use of the row is continued in the first movement of his First Cantata, Op. 29. The structure of the row is modelled after that of Op. 28. The retrograde is the same as the inversion, and the retrograde inversion is the same as the basic set. In the Cantata, Webern also employs a technique of layered row forms and contrapuntal overlapping of the row transpositions. In a study of the harmonic content of the first movement of the Cantata, Rochberg found that Webern was able to create chains of transpositions by using the last two pitches of one row as the first two of the next row. "Thus starting from the original, he is able to proceed cyclically in a rotational chain which always brings him back to his point of departure."[26] By combining these rotating row forms with a system of layered row forms Webern is able to create a series of six different four-note chords as defined by pitch content, which remain invariant

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[25] Herbert Eimert, "Interval Proportions," trans. by L. Black, Die Reihe, 2 (1959), p. 94.

[26] George Rochberg, "Webern's Search for Harmonic Identity," Journal of Music Theory, 6 (1952), p. 115.

throughout the cycle of the rotating transposition. These chords first appear in the opening orchestral introduction and are then used in the choral sections of the work. This imposes a harmonic unity on the work which is derived from the particular structural elements of the row. This unity is strengthened by the cyclical row movements and by imitation between the various strata of the composition. Webern was striving toward a tightly constructed work in which relationships could be formed between every part of the composition. This tight structure is also present in his next work, the Variations for Orchestra, Op. 30. In a letter to W. Reich, Webern discussed how he constructed the row for the Variations. The letter reveals the great importance Webern gave to relating ideas to an initial motivic or intervallic idea.

> ...everything that occurs in the piece is based on the two ideas given in the first and second bars (double bass and oboe!). But it's reduced still more, since the second shape (oboe) is itself retrograde; the second two notes are the cancrizan of the first two... they are followed on the trombone by a repetition of the first shape but in diminution! And in cancrizan as to motives and intervals. That's how my row is constructed --it's contained in these thrice four notes... twelve notes, that's to say the row.[27]

Webern's last complete work, the Second Cantata, Op. 31, is unique in several respects. First it is one of his longest compositions in terms of performance time, and second, it repeats the last movement with no variation other than a

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[27] Webern, Path to the New Music, p. 62.

text change. The use of the row is similar to that in Op. 29 in that a limited number of vertical configurations are employed. The fifth movement makes extensive use of symmetrical pairings of the row. The four sections of the movement use three different row forms appearing in the following orders: section one, retrograde, inversion, retrograde; section two, original, retrograde inversion, original; section three, retrograde inversion, original, retrograde inversion; section four, inversion, retrograde, inversion. The work is unified through the text, and again, by the use of the row. The row serves to provide the material out of which Webern builds his composition. While writing about the Cantata, particularily the first section, Webern reaffirmed his faith in the necessity of the series "...the way it is carried out was only possible... on the basis of the law of the row, which is quite particularily in evidence here. In fact this may well be the first time it's been so completely operative."[28]

In a review of Webern's use of a serial tone row, the growing integration of the row materials into the fabric of the composition becomes evident. The later works show an increasing awareness of the possible advantages of using row structures which are internally related. Parallel to this desire for internal relationships, the last five works

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[28] Ibid.

also reveal a development toward limiting the harmonic configurations found within a work. Krenek goes so far as to claim that "in Webern's late works one may observe a gradual extension of the principle of premeditated serial arrangements into other aspects of the music."[29] It is in Webern's work that the row is used in a most compact and yet most complex manner. "Here the urge toward maximum unity found its fulfilment."[30]

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[29] Ernest Krenek, "Anton von Webern: A Profile", Anton Webern Perspectives, ed. D. Irvine (Seattle: University of Washington, 1966), p. 14.

[30] Webern, Path to the New Music, p. 53.

CHAPTER IV

POST-WEBERN DEVELOPMENTS

"Mathematical music evolved with difficulty from an unimaginative brain."[1] A succinct summation of the feelings of many individuals towards total serialism, however, the aptness of the quotation is rather ironic since it is from an early review of Brahms' C Minor Symphony. Nevertheless, it has been observed that much of the music written by the serialists of the post-Webern era has not been enthusiastically received by the public. The problems facing these composers are not unique -- the public has frequently been reluctant to accept anything new or unfamiliar. These composers, members of the so called avant garde, are loosely united by a common philosophy emanating from the American, John Cage. This philosophy is based on a "concentration upon familiar relationships of space and time, and sound and silence, rather than on new melodies and chords, and upon a conviction that all musical relationships whether arrived at by chance or by design have potential value and are worth examination."[2] It is this emphasis on the explora-

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[1] Boston Gazette, January 22, 1878. Quoted in Nicholas Slonimsky, Lexicon of Musical Invective (New York: Coleman Ross Co., 1953), p. 6.

[2] Henry Cowell, "Current Chronicle: New York," Musical Quarterly, 38 (February, 1952), p. 127.

tion of the unfamiliar which has led to the inaccessibility that the public generally feels toward their experiments. As composers, this group is committed to an expansion of the vocabulary of music beyond the traditionally accepted boundaries. In their search for material, some, like Stockhausen, have gone beyond the limitations of conventional instruments and moved into the area of electronically produced sounds. Others, notably John Cage with his prepared piano, have modified existing instruments and introduced everyday noises into the sphere of music. Experiments are also conducted with combinations of all these elements. As well as Stockhausen and Cage, others working in these new fields are Pierre Boulez, Luigi Nono, Henri Pousseur, Bruno Maderna, and Luciano Berio.

Just as the musical styles of Berg and Webern evolved through modifications of Schoenberg's principles of composition, the avant garde have arrived at their compositional viewpoint through an adaptation of the late style of Webern. The concept of serial organization was expanded to cover all parameters of the musical composition. The result is not only the organization of pitches but also of durations, intensities, and timbres. This serialism was then further expanded to cover wide areas such as relationships of register and density, distribution of various types of movement, and structure. As a result of this extensive serialization, new trends in composition appeared. The function of the pitch series was weakened by several of these trends, one

of which was a preference for a homogeneous interval sequence like the chromatic scale. This would remove any unique characteristics the row may have had. Another trend was the linkage of the pitch series with some other series like a fixed set of rhythmic proportions. Again this underplays any distinctive features of the row. Some composers determined the structure of their works from the relations of density, distribution of registers, and various displacements of vertical complexes, rather than from the organization of internal row relationships and systems of juxtaposed row transpositions. With these new developments the tone row loses much of its unifying power and is subordinated to other ordering factors.

The complexity of this organizational system results in a paradox. The composer has discovered that the more he tried to pre-determine the results of his compositions, the less he can determine concerning the order and relationship of the elements. Once the composer chooses the particular arrangement of rows he is going to use, he has also determined the harmonic combinations which will result. The greater the number of serialized elements, the less control the composer has after he makes his initial choices. This paradox also applies to the effect upon the listener, because, although the work has a highly ordered structure, the cumulative effect is close to that of indeterminacy. Rochberg compares the effect of total serialization with the physical concept of entropy which measures the tendency

of nature to disorder events into a final state of equilibrium. He goes on to conclude that, through the equivalence principle, total serialization tends toward the establishment of an equilibrium in musical space and thereby the reduction of differentiation to a minimum.[3]

An application of the principles of total serialization can be examined in the piece, Structures, by Pierre Boulez. The work is written for two pianos and is in three movements. The tone row is taken from the Mode de valeurs d'intensites by his teacher, Olivier Messiaen. (Example 1.)

Example 1. Boulez, tone row from Structures.

This row is used in the inversion, retrograde, and retrograde inversion, as well as in all of the possible transposed forms. Duration is another parameter which is serialized. Boulez chose a basic unit, a thirty-second note, which is multiplied by one through twelve. Thus Boulez derived twelve different time units which were then arranged in an increasing arithmetic series. (Example 2.)

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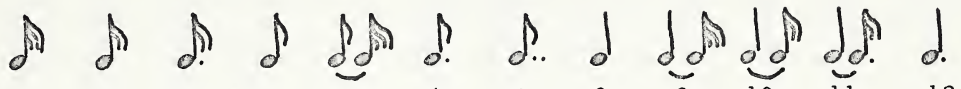
[3] George Rochberg, "Indeterminacy in the New Music," Score, 26 (January, 1960), pp. 11-13.

Example 2. Boulez, rhythmic series and its order numbers from Structures.

Rhythmic series



1 2 3 4 5 6 7 8 9 10 11 12

Order numbers

This rhythmic series is permutated in a manner similar to the tone row.

To facilitate the permutation of the rhythmic and tone series, Boulez used a table (ex. 3) from which he derived the various note and rhythmic rows. This table gives all the possible transpositions and transformations of the note series but, when applied to the rhythmic series, it acts as a limiting factor. Since not all the possible rhythmic series appear in the table, it presents an arbitrarily chosen set of rhythmic progressions. To derive a rhythmic series, a horizontal row of numbers is chosen from the table, for example, the third row of the original chart. The numerals are 3, 4, 1, 2, 8, 9, 10, 5, 6, 7, 12, 11 (see ex. 3). These numbers are then related to the order numbers of the original rhythmic series (see ex. 2) and translated into a series of durations. (Example 4.)

Example 3. Boulez' transposition chart for Structures.[4]

Chart for original versions

1	2	3	4	5	6	7	8	9	10	11	12
2	8	4	5	6	11	1	9	12	3	7	10
3	4	1	2	8	9	10	5	6	7	12	11
4	5	2	8	9	12	3	6	11	1	10	7
5	6	8	9	12	10	4	11	7	2	3	1
6	11	9	12	10	3	5	7	1	8	4	2
7	1	10	3	4	5	11	2	8	12	6	9
8	9	5	6	11	7	2	12	10	4	1	3
9	12	6	11	7	1	8	10	3	5	2	4
10	3	7	1	2	8	12	4	5	11	9	6
11	7	12	10	3	4	6	1	2	9	5	8
12	10	11	7	1	2	9	3	4	6	8	5

Chart for inversions

1	7	3	10	12	9	2	11	6	4	8	5
7	11	10	12	9	8	1	6	5	3	2	4
3	10	1	7	11	6	4	12	9	2	5	8
10	12	7	11	6	5	3	9	8	1	4	2
12	9	11	6	5	4	10	8	2	7	3	1
9	8	6	5	4	3	12	2	1	11	10	7
2	1	4	3	10	12	8	7	11	5	9	6
11	6	12	9	8	2	7	5	4	10	1	3
6	5	9	8	2	1	11	4	3	12	7	10
4	3	2	1	7	11	5	10	12	8	6	9
8	2	5	4	3	10	9	1	7	6	12	11
5	4	8	2	1	7	6	3	10	9	11	12

The retrograde forms of the original and inversion are found by reading the chart from right to left.

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[4] The Chart is given in the article, "Four Musicians at Work," Trans/formation, 1/3 (1952), p. 169. Boulez explains his derivations of the transpositions from the tables.

Example 4. Boulez, rhythmic series no. 3 from original chart.

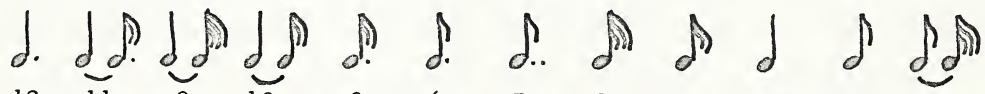
This procedure may be applied to any of the horizontal lines on the table. Using this method of derivation, there are an equal number of duration and note series available. Although the rhythmic series is arbitrarily derived from the note orders of the different row forms, shown by order number on the table, it is not permanently linked to any specific note row formation. This means that any durational series may be combined with any note series.

Boulez derived other serial rows from his tables which he used to determine the order of intensity and attack. Again these are arbitrarily selected.

To illustrate how Boulez used his row and rhythmic series, the opening section of the first movement of Structures is analyzed. Bars 1-7 form the first division of the movement. In these bars Boulez states his note row in two forms, Piano I gives a complete statement of the original note row, while Piano II has the inversion of that row. Just as he used forms of the note series, Boulez also states two different durational series. These series are derived from the retrograde forms of the twelfth series on

each of the original and inverted charts (see ex. 3). Piano I is given the retrograde of the inversion (ex. 5) while Piano II has the retrograde of the original (ex. 6). (Examples 5 and 6.)

Example 5. Boulez, rhythmic series, Piano I, Structures, bars 1-7.



Example 6. Boulez, rhythmic series, Piano II, Structures, bars 1-7.

In the next group of row statements, bars 8-15, Boulez expands the number of row forms to four. Each piano part contains two different forms. Piano I states the seventh and third orderings from the original row forms, while Piano II states the seventh and third inverted forms. Rhythmically, the series used are the next ones appearing on the chart (ex. 3), Piano I has the eleventh and tenth retrograde inversion series, and Piano II has the corresponding eleventh

and tenth original retrograde forms. In the following section, bars 16-23, Boulez begins to thin the texture by using one less row form and one less rhythmic series. He uses two row forms in Piano I, the original tenth and twelfth, but uses only one form in Piano II, the inverted tenth form. The rhythmic series are continued in the order of the two charts, beginning at the bottom. The rhythmic forms are the retrogrades of the ninth and eighth forms of the inverted series, and the ninth form of the original in retrograde. The section closes with a solo for Piano II using the twelfth row form and the eighth version of the original form of the rhythmic series heard in retrograde. This completes a cycle, an equal number of original and inverted note-row forms being used. A similar pattern is used in rhythmic rows with an equal number of original and inverted retrogrades.

It is interesting to note that in this section of the first movement, Boulez used a series to determine which note-row form he would use, and in what order they would appear. The row forms used are the first, seventh, third, tenth, and twelfth. These numbers represent the order numbers of the first five notes of the set inversion. This series is completed in the next section which begins by using three row forms -- the ninth, second and eleventh. Thus the observation is further confirmed as these numbers are a continuation of the series established in the first section. Boulez seems to be systematically using several different rhythmic and note series, and in the course of the work does

use all the available row forms.

Although rhythm and pitch are serialized, Boulez can still determine in what register the notes appear, and it is this placement which gives the composition its distinctive sound. He used wide leaps and contrasting registration, and the resulting effect is very pointillistic. The formal structure of the movement is derived from the use of sections determined by changes in tempos.

A different approach to the concept of total serialization is found in Luigi Nono's cantata, Il Canto Sospeso. The work is scored for a large orchestra, vocal soloists, and a chorus. Nono uses serial forms for his note row, rhythmic figurations, and his dynamic structure. In this work Nono places his various lines in layers so as to form moving blocks of sound. This layering is particularily evident in the second movement of the work, set for a capella choir. The choir is divided into eight parts, and through the use of rests, the four different layers are distributed amongst the eight parts. The layers are formed by employment of a rhythmic series of the ratio 2:3:4:5. Karlheinz Stockhausen, in a discussion of the cantata, shows the distribution of the layers in the first twelve bars.[5] (Example 7.)

Example 7. Nono, layer distribution in bars 1-12 of the second movement of Il Canto Sospeso.

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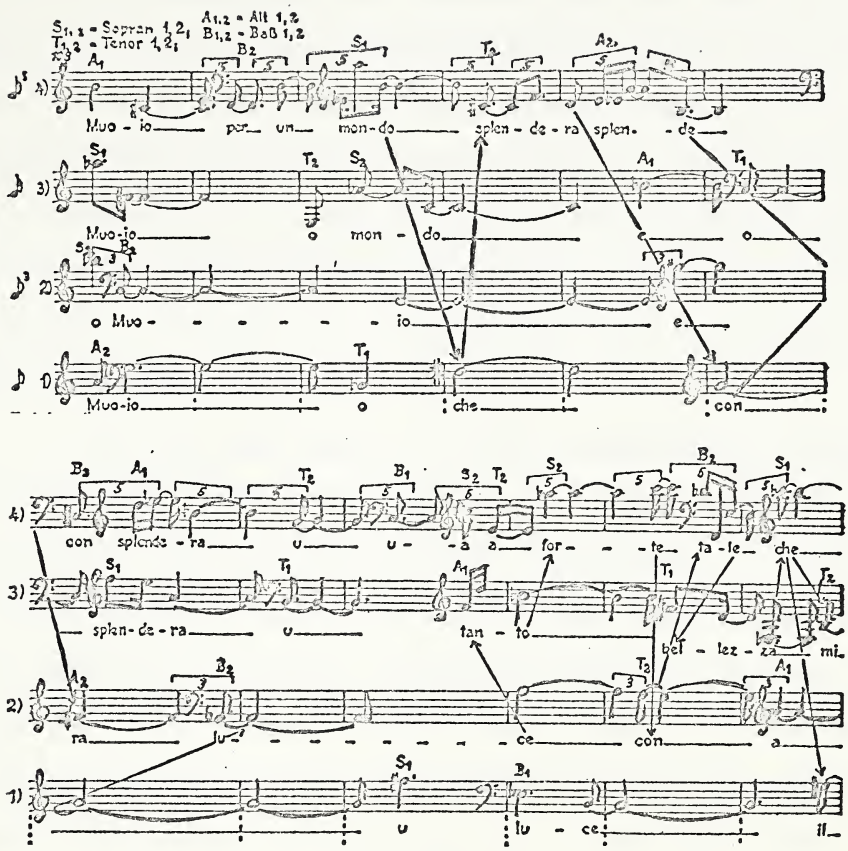
[5] "Music and Speech," trans. by Ruth Koenig, Die Reihe, 6 (1964), pp. 50-51.


S1,2 = Sopran 1,2
T1,2 = Tenor 1,2
A1,2 = Alt 1,2
B1,2 = Baß 1,2
Muo - io por un mon-do splen - de - ra splen - de
Muo-io o mon - do o
o Muo - - - - - - io e
Muo-io o che con
con splends - ra u u - a a for - - - te ta - le che
splen-de-ra u tan - to bel - lez - za mi
ra lu - - - - - - - ce con a
u lu - ce il

As can be seen from the example, the crossing of the parts makes the layers very difficult to distinguish aurally. The words are often fragmented amongst the different voices, sometimes each syllable set in a different voice. The total effect is that of continuously changing levels and colours. This cantata provides an excellent example of the contemporary techniques of using contrasting planes of sound to express words of deep emotion.

In words like those mentioned above, it is difficult to explain how unity is achieved. Because the parameters

are serialized there is a logical plan for the structure, but this plan is not aurally evident, and so contributes to the unity only indirectly. Another aspect of the problem lies in the philosophy of the composers. Since these men are interested in the exploration of new methods and sonorities, it is not valid to judge their works by traditional standards of unity even though they are not totally devoid of traditional methods.

The dominant aspect of these compositions is the use of contrast. The Boulez work in particular illustrates this. Because of the instrumentation -- two pianos -- little timbre differentiation can be achieved, and so, in order to compensate for this, Boulez explored the various contrasting sonorities possible within the range of the piano. Further contrasts were achieved by texture variations. In the first movement of Structures, Boulez began with a thin and simple statement of the row. Then he moved toward a progressively more complex texture and row treatment, returning to the less complex row statements for the conclusion. The same process is used in his treatment of the rhythmic rows. This type of pattern is evident throughout all the movements of the work and gives a feeling of development and conclusion.

Nono's cantata does not have the same problems of contrast evident in the Boulez' work. Through his instrument choice, Nono has a number of possible contrasts such as voice and instrument, soloist and chorus, instrument and

other instrument. From these elements and the structure of his text, Nono developed the form of this composition. Because the text consisted of several sections spoken by different people, the formal divisions were almost predetermined. These structural aids give the work a strong formal design which helps to dispel feelings of indeterminacy caused by the total serialization. Working within this structure, and successfully using the contrast inherent in his material, Nono was able to create a personal expression within the restrictions of his serial plan.

The unity in both these compositions is derived from the effective presentation of a number of changing textures, sonorities, dynamics, and tempos. It is the relationships of these elements which provide the cumulative unified effect.

The concepts which Boulez and Nono used in their totally serialized works have application in the newest musical field, that of electronic sound. It is possible with electronic equipment to produce an infinitesimal range of sounds, both audible and inaudible to the human ear. Although some of the compositional techniques of instrumental music are possible in electronic composition, four main characteristics differentiate it from instrumental music. Stockhausen lists these as:

(1) correlation of coloristic, harmonic-melodic, and metric-rhythmic aspects of composition

(2) composition and decomposition of timbres

(3) characteristic differentiation among degrees of intensity

(4) ordered relationship between sound and noise.[6] Electronic music has a range of pitch, dynamics, timbre and rhythm unrestricted by the limitations of instruments and performers. As in totally serialized music, electronic music uses juxtapositions of textures, changing sonorities, and more recently, stereophonic effects. The techniques for unification are not yet clearly defined. One recent experiment used a serial row structure.[7] The rows were constructed and used in a manner similar to twelve-tone composition. A base frequency was established and the row was built from it, care being taken to avoid harmonic intervals of simple ratio. Transpositions of the row are obtained by changing the base frequency. Although this application of serial row techniques is not widely used in electronic composition, it is one aspect of its development. Further experiments are needed before any theory of unification is evolved.

A discussion of a twentieth-century musical phenomenon should not ignore the contributions of Igor Stravinsky. Although Stravinksy was always thought to have been opposed to serialism, it is not surprising that he eventually began to explore its possibilities as a musical technique. Around

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[6] Karlheinz Stockhausen, "The Concept of Unity in Electronic Music," Perspectives of New Music, 1 (Fall, 1962), p. 39.

[7] Myron Schaeffer, "An extension of tone-row techniques through electronic pitch control," Journal of the International Folk Music Council, 16 (1964), pp. 95-99.

1950 Stravinsky began to adopt some of the techniques of serialism, much to the shock and dismay of a number of his admirers, but as Roman Vlad has observed, "there are advance warnings of a 'serial' phase in Stravinsky's music in works written long before 1950." Vlad goes on to cite developments in the Three Pieces for string quartet, 1914, The Five Fingers, 1921, and also the symphonies of 1940 and 1945.[8]

The introduction of serial procedures into Stravinsky's compositions was apparently a carefully planned development. He approached the problem slowly and mastered each section of the technique before moving on to the next phase. Part of the movement toward serialism is seen in the Cantata, written in 1952. Here Stravinsky showed an interest in complex canonic devices and in the use of inversion and retrograde as compositional techniques. Although there is no serial treatment within the Cantata, it marks the direction in which Stravinsky was turning. The works following the Cantata indicate the gradual development of Stravinsky's serial technique. The passacaglia of the Septet, written in 1953, used a sixteen-note theme which is treated as a set. The gigue of the same piece employs an eight-note row derived from the passacaglia theme. Stravinsky indicates in the score how the row is employed in the gigue, and what

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[8] Roman Vlad, Stravinsky, trans. by Anne and Frederick Fuller (2nd ed., London: Oxford University Press, 1967), p. 178.

form it is taking. His next two compositions, both vocal works, also explore row possibilities. "Musick to heare", from Three Songs from William Shakespeare, is based on a limited four-note group. This row is used in its inversion, retrograde, and in many transpositions. The other vocal work, In Memoriam Dylan Thomas, used another very limited grouping, this time of five notes. There is a vague tonal feeling in the work, and the interval of the third is prominent. The Canticum Sacrum, written as a commission for St. Mark's Cathedral in Venice in 1956, contained Stravinsky's first use of a series employing all twelve notes of the chromatic scale. The work divides into five movements, introduced by a Dedicatio. The first and fifth movements are written for full chorus. The fifth movement is a retrograde of the first chorus with the addition of a short adagio "amen". The internal movements use a complete dodecaphonic row. The row is introduced in the second movement by the tenor in his opening phrase. (Example 8.)

Example 8. Stravinsky, tone row from the second movement of Canticum Sacrum.

In this row each hexachord has a tonal centre, G for the first and C for the second. The tonal feeling is heightened

because the penultimate note of each hexachord acts somewhat as a leading tone. There are also other tonal implications within the series. These further add to the fonal feeling. The movement is unified through careful use of the various tonal areas and by the uniformity of the lyrical treatment.

A new row forms the material for the third movement but it is closely related to the series of the second movement. The row treatment is complex and is based largely on canonic principles. Since the third movement is the centre of the work it is the most extended section in the piece. The series for the fourth movement is derived from that of the third. The original form of the fourth movement row is the retrograde inversion of the third movement row.

Stravinsky's next composition, the ballet, Agon, was written over a number of years. He originally began work on the ballet in 1953, but it was not completed until 1957. Like the Canticum, Agon contains both freely composed and strict serial sections. Another similarity is in the form--Agon too, closes with a reprise of the opening movement.

The first composition using a tone row in all its movements appeared in 1958, a setting of sections of the Lamentations. Threni uses a Latin text, chosen from the Vulgate. The original thematic idea is first stated by the soprano soloist accompanied by the alto soloist singing the thematic inversion. This thematic idea presents the series upon which the remainder of the work is based. Although the work uses a tone row throughout this in no way inhibits Stravinsky.

He still uses note repetitions, employs the occasional diatonic melody, and exploits all possible relationships in the row, including tonal ones.

In Stravinsky's remaining works, he has continued to write in a serial manner. As he becomes more familiar with the technique he uses more row forms and different juxtapositions of them. In a few later works, particularily the Variations written as a memoriam to Aldous Huxley, Stravinsky explored the use of contrasts as a part of his formal structure. He used instrument families and individual members in contrasting roles.

One of the most interesting aspects of Stravinsky's use of serial techniques is that the music still retains many of the elements so characteristic of Stravinsky. Although using a serial tone row, he does not abandon his own idiomatic treatments of rhythm, melody and harmony, but instead he modifies the serial technique. From an examination of several different Stravinsky serial works, certain characteristic traits in treatment can be found. He seems to use different approaches to the row. In one method, he uses the row as part of the formal structure. To do this he begins the work in a diatonic manner, often freely composed, then moves toward a total chromaticism and serialism finally returning to a more diatonic area for the conclusion. This return often is in the form of a recapitulation of the opening materials, as in Agon. If the work uses serial techniques throughout, as in Threni, a similar pattern is used, but the

middle section is more complexly organized often employing canonic devices and several row forms. Another feature which is found in the works is a consistent allusion to some feeling of tonality throughout the work. One study of Stravinsky's serial works found that an avoidance of the tritone in the basic series, and an harmonic idiom avoiding tritone-structured sonorities, combined with a system of extracting tonal roots through use of pedal points, suspension, ostinati, and octave doublings, resulting in a tonal polarization of the twelve-tone idiom.[9] It is this polarization which give these serial works their typical Stravinsky sound.

Although Stravinsky uses a tone row in these compositions, it is employed as one part of a complete technique and it does not become the main unifying device. Unity in these works comes from Stravinsky's unique blending of traditional forms, cyclic repetitions, a distinctive rhythmic structure, hints of tonality and a serial tone row. Stravinsky has explained how he works with a row and why he is not a twelve-tone composer. Instead he composes in his usual way, borrowing some of the techniques of twelve-tone composition.

The intervals of my series are attracted by tonality;

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[9] David Ward Steinman, "Serial Techniques in the Recent Music of Igor Stravinsky" (unpub. doctoral dissertation, University of Illinois, 1961), Dissertation Abstract XXII, pp. 2026-27.

> I composed vertically and that is, in one sense at least to compose tonally.... I hear certain possibilities and I choose. I can create my choice in serial composition just as I can in any tonal contrapuntal form. I hear harmonically, of course, and I compose in the same way I always have....[10]

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[10] Igor Stravinsky and Robert Craft, Conversations with Igor Stravinsky (New York: Doubleday, 1959), p. 24.

CHAPTER V

SUMMARY AND CONCLUSION

Summary

The unifying effect of a serial tone row has been diverse and varied. From the initial experiments in the late nineteenth century to the complex applications of the twentieth century, the row has gone through many changes. The early essays into serialism, discussed in Chapter I, were isolated incidents, the result of individual experimentation. A compositional theory was not developed from these events but the experiments did play an important part in the disintegration of the existing tonal system. It was not until the 1920's that a theoretical system was proposed. Joseph Hauer and Arnold Schoenberg both developed methods which organized the full resources of the chromatic scale. Hauer had limited influence, but Schoenberg's method had far reaching influence which is still felt today.

Schoenberg's application of his system to his compositions revealed the conflicting sides of his character. He was trying to solve the formal problems associated with atonality and yet he still felt a strong affinity for many of the traditional solutions to formal design. The result was a unique blend of atonal sound elements with traditional forms and thematic development.

Schoenberg used his row as one of the strong unifying elements. He derived much of his thematic and harmonic material from it and thoroughly integrated it into his structure. Although Schoenberg used other unifying elements, like rhythm and motivic materials not directly derived from the row, the row is one of the main elements contributing to the overall unity of his serial works.

Alban Berg adopted Schoenberg's method of composing, and adapted it to fit his own personal musical idiom. Berg integrated his compositional preferences for the intervals of the fourth and seventh into the structure of the row. Being a lyrical composer, he often wrote rows which lent themselves to vocal treatment. Another aspect of Berg's work was his investigation of the problem of creating tonal functions within the vocabulary of total chromaticism. In his compositions, Berg sought a solution to the problem of combining a row structure with areas of tonality to create a convincing and unified structure. see pg. 93

Anton von Webern further added to the existing serial tone-row techniques. His characteristically concise musical language was based on row structures which contained many internal relationships. These relationships were fully utilized in the course of the composition, often through complex canonic devices. In his later works, Webern began exploring the possibilities of limited harmonic configurations derived from the row. Webern's compositions are tightly

integrated pieces, deriving their unity from the development of the relationships found initially in the original row.

The developments which followed Webern led in the direction of total serialization, an attempt to control all aspects of the musical composition. In this situation the tone row lost some of its unifying force and became subordinated to a larger organization. Also subordinated were traditional concepts of thematic statement and development. These ideas were replaced with the concept of contrasting sound planes and an exploration of all types of sound materials. The unity of these works is based on an effective use of all these different types of contrast. Similar criteria for establishing unity were applied to compositions composed with electronic sounds.

Igor Stravinsky is another post-Webern serial composer, but Stravinsky adopts the technique to fit his own musical idiom. This idiom is primarily harmonic, and by superimposing it on the basically linear serial technique, many of the contrapuntal characteristics of serialism are lost, and the row becomes one of several different constructive techniques.

Conclusion

It is concluded that a serial tone row acts as a strong unifying force when used as the central technique of a musical composition. Both thematic and harmonic materials are derived from it, and the row also plays an important role

in the structural aspects of a muscial composition. The row transpositions give variety within the established framework. These transpositions often establish formal relationships between different areas of the composition, sometimes implying traditional forms. The structure of the row itself dictates the type of development to which it is adapted. Because of this factor, the composer is careful to tailor his row to fit his own musical predilections.

In the works using a process of total serialization, the tone row is less effective as a unifying force. It is replaced by the complex system of many serialized parameter. Although this extreme serialization results in a highly organized structure, the order is really only theoretical since the total effect is so very close to indeterminacy. A tone row may also be used in a tonally oriented section, but in such instances the unifying power of the row is diminished. It is replaced by the ordering power of the tonal associations found within the row and the section.

It would be naive to assume that the tone row acts as the sole unifying agent in the twelve-tone works. As in any other musical idiom, the elements of rhythm, instrumentation, register, dynamics, and phrase structure all contribute to the musical whole of a twelve-tone composition. It is beyond the scope of this study to deal with the interaction of all these elements, but it was possible to examine theoretically the degree to which a composer uses his tone row as a means of achieving musical unity.

There is another factor involved in musical unity--the listener and his response to the music. This is a difficult area to assess. In his study on musical perception, James Hartman claims that compositions using a serial tone row present a special problem to the listener because he is usually more familiar with eighteenth- and nineteenth-century Western music, which, in all cases, uses some of the relationships of the diatonic scale. These relationships "constituted a thoroughly grounded set of expectations within which each work moved."[1] Since each twelve-tone work has a row structure not associated with the diatonic scale this "grounded set of expectations" is not valid leaving the uninitiated listener in unfamiliar territory. This unfamiliarity often causes him to misinterpret what he has heard, or simply to reject it because of a lack of understanding. Although music composed with a tone row is often subject to this misinterpretation and rejection, it must not be assumed that the music is incoherent, illogical or meaningless. As this study has shown, twelve-tone music is a tightly integrated and unified form of musical expression which derives much of its unity from the diverse applications of the tone row. Familiarity with the idiom and the compositions will reveal this unity to the listener.

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[1] James Hartman, "The Gestalt Theory of Musical Perception" (unpublished Ph.D. dissertation, Northwestern University, 1959), p. 128.

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